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Journal of the Minnesota State Medical Association

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JULY, 1920

CONTENTS

ORIGINAL ARTICLES

JOSEPH B. DELEE, M. D.—The Treatment of the Second Stage Labor with Special

Reference to the Prevention of Injury to the Child and to the Pelvic Floor.... 317

C. H. MAYO, M. D.—The Surgical Treatment of Bunions..... 326

A. L. McDONALD, M. D.—Tumors of the Great Omentum..... 331

ARTHUR A. LAW, M. D.—War Wounds of the Major Joints..... 337

GEORGE EARL, M. D.—A Modified Inguinal Hernia Technique..... 342

SAMUEL C. PLUMMER, M. D.—Surgical Shock..... 345

(Continued on Advertising Page III.)

Owned and Published Monthly by

THE MINNESOTA STATE MEDICAL ASSOCIATION

BUSINESS MANAGER

J. R. BRUCE, 403 Central Bank Bldg., Saint Paul

Telephone: N.W. Cedar 1683

Entered at the Post Office in Saint Paul as second class mail matter.
Accepted for mailing at the special rate of postage provided for in section 1103, act of October 3, 1917, authorized July 13, 1918.

Subscription Price { \$3.00 yearly, Domestic
 \$3.50 yearly, Foreign

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MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association

Vol. III

JULY, 1920

No. 7

ORIGINAL ARTICLES

THE TREATMENT OF THE SECOND STAGE OF LABOR WITH SPECIAL REFERENCE TO THE PREVEN- TION OF INJURY TO THE CHILD AND TO THE PELVIC FLOOR*

By JOSEPH B. DELEE, M. D.
Chicago, Ill.

The second stage of labor begins when the cervix is completely dilated, and ends with the finished delivery of the child. It is often called the period of expulsion, but it is also a period of preparation of the soft parts,—vagina, pelvic floor and perineum, the preparation and expulsion occurring together. This stage lasts on the average from two to three hours in primiparae, and from ten to thirty minutes in multiparae.

This paper will be limited to the discussion of the phenomena of cases of primiparae or multiparae whose pelvic floor, by virtue of repair, offers the same resistance to the presenting part, and will treat only that portion of the delivery called the second stage, the time of expulsion.

In this restricted part of labor, lasting but two hours, many children's lives are lost, not a few women die, and many children, as well as mothers, are irreparably damaged.

Labor has been called, and still is believed by many to be, a normal function. It always strikes physicians as well as laymen as bizarre, to call labor an abnormal function, a disease, and yet it is a decidedly pathologic process. Everything, of course, depends on what we define as normal. If a woman falls on the handle of a pitchfork and ruptures her perineum, we

call that pathologic,—abnormal; but if a large baby is driven through the pelvic floor, we say that it is natural, and therefore normal. If a baby were to have its head caught in a door very lightly, but enough to cause a cerebral hemorrhage, we would say that is decidedly pathologic, but when a baby's head is crushed against a tight pelvic floor, and a hemorrhage in the brain kills it, we call this normal, at least we say that the function is natural, not pathogenic.

In both cases the causes of the damage, the fall on the pitchfork and the crushing of the door,—are pathogenic,—that is disease producing, and in the same sense labor is pathogenic,—disease producing, and anything pathogenic is pathologic or abnormal.

Now you will say that the function of labor is normal; that only those cases which result in disease may be called abnormal. Granted, but how many labor cases, measured by modern standards, may be so classified? Sir J. Simpson said that labor, in the intention of nature, should be normal, but that in a large proportion of cases it was not so. If the proportion was large in Simpson's days, the middle of the last century, it amounts to a majority today. In fact, only a small minority of women escape damage during labor, while 4 per cent of the babies are killed and a large indeterminable number are more or less injured by the direct action of this natural process itself. So frequent are these bad effects that I have often wondered if nature did not deliberately intend that women should be used up in the process of reproduction, in a manner analogous to that of the salmon, which dies after spawning. Perhaps lacerations, prolapse, and all the evils soon to be mentioned are, in fact, natural to labor and therefore normal, in the same way as the death of the mother salmon and the death of the male bee in copulation are natural and normal. If you

*Presented before the Southern Minnesota Medical Association, Dec. 1919, Mankato.

adopt this view, I have no ground to stand on; but, if you believe that a woman after delivery should be as healthy, as well as anatomically perfect as she was before, and that the child should be undamaged, then you will have to agree with me that labor is pathogenic, because experience has proven such ideal results are excessively rare.

There is not time here to go further into this part of the subject, so suffice it to say, that beside Sir J. Simpson, others have expressed the opinion that labor is no longer a normal function,—Engelman, the medical historian, J. O. Polak of Brooklyn, Schwartz of St. Louis, F. S. Newell of Boston (qualified), Moran of Washington, Kronig of Freiburg, et al.

What are the factors that render labor so pathogenic? Dangers, immediate and remote, threaten both mother and child throughout, but we will discuss only those of the second period.

First, for the mother. Infection is always a threat, even under the most ideal conditions. Virulent streptococci inhabit a large per cent of vaginae, and if the second stage becomes too prolonged, if the bruising of the parts is too extensive, if the woman's resistance is worn down by too much suffering or by hemorrhage, they may invade the organism and prove fatal. Death may occur in a fashion that hides the cause from the unobservant accoucheur, e.g. a very mild sepsis, or even a single rise in temperature and, in the second week, death occurs from embolism.

Exhaustion is not infrequent in a second stage that may not be too long for a healthy woman, but in one whose nerve reserve is low, exhaustion may lead to immediate nervous shock, and later, pronounced neurasthenia. If the Twilight Sleep propaganda has taught us anything, it showed us the actual value of preserving the nervous strength of the parturient.

That rupture of the uterus may occur in the second stage needs no extended mention, but it is rare and getting rarer every year.

Of greatest importance, because of greatest frequency, is the damage to the pelvic floor and perineum. Embryologically and anatomically, the outlet tissues of the pelvis are to be divided into two parts, the pelvic diaphragm or pelvic floor, made up of the levator ani

muscle with its superior and inferior fascia, and the urogenital septum and perineum. The perineum and urogenital septum lie below the pelvic floor, and do not form part of it, though attached by fascia, and an incision in their continuity will not save the true pelvic floor or diaphragma pelvis from injury. This point is of importance in discussing episiotomy.

Multitudinous volumes have been written on the anatomy of the pelvic floor, thousands of dissections have been made, and yet there is no unanimity of thought on the subject. No one nomenclature is generally accepted; the disposition of the various parts of the muscle and the various layers of fascia, is not positively known; how the pelvic floor acts during the dilatation of the parts in labor is not fully understood; indeed, it might be said, that we know less about the anatomy of the pelvic floor than of any other part of the body. This is the reason of the numerous operations that have been devised for repair of obstetric damage, and their number is legion, and also for the unsuccess of the majority of them. For the last 25 years I have made a special study of the pelvic floor both obstetrically and gynecologically, and I made four dissections of the levator ani, one of them together with Tandler of Vienna, who is Professor of Anatomy at the University, and who wrote a large book on the subject. I also studied his numerous anatomic preparations. One method of investigation that is of enormous value, in fact, hardly less useful than an anatomic dissection, is the minute palpation of the muscle in the living subject, and its study at operation. This source of information has been neglected by most writers, though it is surprisingly easy. I put a rubber catheter into the rectum, which locates this organ, and with the finger in the vagina, palpate out the various structures. The woman is asked to contract and relax the muscles, and they are identified by their actions. During labor, the location and the changes in the levator ani are studied by means of rectal examinations which may be repeated as often as is needed. From all these sources I have gotten quite concise notions of the levator ani and the urogenital septum, some of which I have tried to illustrate in these plastic models, which I show here. Remember that these crude

models are only diagrammatic, but I will vouch for the truth of the lessons they teach.

Model No. 1 shows the normal vaginal pelvic floor.

Model No. 2 shows the pelvic outlet under the distension of the passage of the head. You will notice in addition to radial dilatation, there is also a downward, axial, displacement of all the organs. This downward dislocation of the anus, the sphincter ani, the rectum, and the vagina, is of supreme importance in the operation of the repair. We must anchor all these organs higher up in the pelvis, we must unite them to the parts from which they have been torn, which is not an easy matter. Much discussion has arisen as to whether the muscle or the fascia is the more important in the support of the pelvic viscerae. There should be no discussion,—both are important, but the fascia has a special function of localizing the structures. The fascia that binds the rectum to the levator ani, and spans the hiatus between the levator ani pillars, suffers the most during the overdistension caused by the passage of the head. When this fascia is not properly restored, it allows the levator ani to gape widely a veritable diastasis of the levator pillars similar to diastasis recti abdominis and permits the rectum to roll downward. This causes the increased pelvic floor projection of multiparae, and is shown in model No. 3.

Another form of damage to the levator ani, is a separation of its fibres behind the rectum at the raphe with the muscle of the other side,—the raphe which is attached to the coccyx. When the muscle is torn here, the levator ani halves separate and hang down as two thick pillars on either side of the gaping introitus. Then the anus and rectum sag into the hiatus toward the coccyx. For the proper repair of such a laceration, and also for the repair of the fascia which holds the levator ani pillars together, one would have to unite the two separated halves of the muscles behind the rectum, making an incision behind the anus, between it and the coccyx,—(similar to the Kraske), exposing the muscle through the ischio-rectal fossae, I have performed this operation twice on the cadaver and it truly restores the integrity of the pelvic floor, but it is too bloody and radical for routine practice. We can get sufficient

functional results with a less serious dissection. The accepted method today is to bare the two levator pillars after incising the perineum and uniting the fascia and the muscle in front of the rectum. Now these muscles were never there in nature, but it makes a strong pelvic floor if properly done. Model No. 4 shows this operation.

Still another form of injury to the levator ani is its avulsion from its attachments to the pubis. This form of injury is one of the worst because it is almost impossible to reunite the torn ends to the bone. In one case I elevated the periosteum, to free it so that the muscle could be sewn up in place.

Finally there is the overstretching of the muscles and the fasciae. Some injury to the diaphragma pelvis occurs in the vast majority of labors and the results are felt throughout life. The urogenital septum is invariably torn in full term labor. I have seen a hymen intact after coitus, but I have never seen a urogenital septum intact after full term labor. Since this laceration is constant, it is therefore natural, and therefore should be called normal, but since it leads to many pathologic sequelae, I would call it pathogenic and therefore pathologic. The urogenital septum is composed of the rudimentary perineal muscles and of fascia and it closes the hiatus urogenitalis. If it is torn the vulva gapes, the vagina is exposed to infection and dirt of all kinds, especially the entrance of feces. These set up vaginal and cervical catarrhs, which may be the beginning of local infections, at least they often cause pelvic discomfort, backache, invalidism and leucorrhea.

The fascia between the bladder and vagina (the utero-vesico-pubic ligaments) is continuous with the urogenital septum. It is almost always more or less injured in full term labor, and this injury is very serious. The bladder sags, the urine may not be all emptied and we all know the ultimate effects of residual urine,—cystitis, ureteritis, pyelitis, even pronounced Bright's disease.

When the lacerations of the subvesical fascia and the urogenital septum are combined with laceration of the diaphragma pelvis (the levator ani) the late results are still more pronounced and pathologic. The cystocele be-

comes more marked, rectocele occurs, (with constipation, etc.) the uterus sags and begins to prolapse. The ureters are drawn down with the uterus and become kinked, causing partial hydronephrosis which invites kidney infections.

The congested uterus, exposed to infection, gets large and hard, the so-called myopathia uteri or chronic metritis. Without doubt it causes general, as well as local, symptoms which are only relieved by its removal or by radium.

Among the late effects of pelvic floor lacerations must be mentioned neurasthenia and invalidism.

The dangers of the second stage of labor to the child are much greater than one who has not studied the matter would think. It will surprise some who are present to know that the following injuries have been caused by the forces of natural, spontaneous labor;—fracture of the skull; rupture of the tentorium cerebelli; intracranial hemorrhage (numerous minute and large ones); retinal hemorrhage, abruptio retinae, dislocation of the lens; facial paralysis; Erb's paralysis; rupture of the sternocleidomastoid muscle, already diseased, resulting in wry neck; fracture of all the long bones of all the extremities, rupture of the cord, tearing of the cord from the belly, etc.

The most common dangers, however, and therefore the most important, are asphyxia from abruptio placentae or prolonged compression of the brain, and intracranial hemorrhages. Brothers of New York found that 5 per cent of children died during labor. Holt and Babbitt of New York, 4.4 per cent, Schultze, 5 per cent, and 1.5 per cent in 24 hours from the trauma of labor, Kerness of Munich found 5.2 per cent, and Potter of Buffalo had 4 per cent fetal mortality. A certain portion of these deaths occurs in natural, unassisted labor. How many babies are hurt and damaged in operative delivery cannot be determined but their number is legion,—and the same must be said of the effects of natural labor. Anyone who has thoughtfully studied the head of a child moulded by strong pains through the tight pelvis of a primipara, will agree with me that the brain has been exposed to much injury. The long sausage-shaped head means that the brain has been dislocated, the

overlapping bones indicate that the sinuses have been compressed with resulting cerebral congestion; the caput succedaneum evidences the pressure to which the brain was subjected. If there is a caput on the outside of the skull what of the inside? The punctate hemorrhages in the skin confirm the last mentioned finding; the subconjunctival ecchymoses show us the possibility of hemorrhage into the retina. From outward, visible evidences, therefore, we can deduce that the brain has suffered distortion, congestion, edema, compression and hemorrhages, but we need not rely on deduction alone. Clinically, if you listen continuously to the fetal heart tones, you will be convinced that the child is suffering, and autopsies bring the final proof of the above assertions. Neurologists for many years have pointed out the connection between epilepsy, idiocy, imbecility, cerebral palsies and prolonged hard labors. Observant obstetricians have known this for so long that it is an accepted fact. In 1917, Arthur Stein of New York reviewed the literature on the subject; he studied 5,562 cases in various homes for feeble minded children, and comes to the conclusions given above. Indeed, although the statistics are meagre, they seem to show that instrumental delivery is safer than prolonged, hard, unassisted labor. Stein's article is well worth reading, as it quotes numerous accoucheurs and neurologists of scientific standing who support this view. One may well ask himself whether the short, and moderate in amount, compression of the head in a skillfully performed forceps operation, is not less dangerous to the integrity of the brain than the prolonged pounding and congestion it suffers from a hard spontaneous delivery. If a late forceps operation is done on a head and brain already infiltrated with small hemorrhages, the results are worse, compounded

Anoxemia (anaeriosis—the beginning of asphyxia) of the child in the second stage is a not uncommon condition, but fortunately most children are born before the asphyxia becomes fatal. In the Chicago Lying-in Hospital, hardly a month goes by, but what one or more infants die from this cause. Either the child is still-born or dies a few minutes after birth, or dies within the week from atelectasis. Most so-called blue babies are simply atelectatic.

The asphyxia may be primary,—from separation of the placenta, pressure on the cord, tetanic action of the uterus, etc., or it may be secondary to cerebral compression or hemorrhage. Its beginning and progress may readily and easily be determined by means of the stethoscope, industriously applied during the second stage. Another result of asphyxia in labor is infection of the fetus. In gasping for air the child inspires vaginal mucus, and later develops pneumonia or intestinal sepsis.

Among the late effects of prolonged labor must be mentioned permanent disorders of the special senses, sight and hearing, due to hemorrhages into the nerve endings, the nerve itself, or its nuclei. Fetal deaths and all the complications are more frequent in primiparae, as would be expected, even if the statistics and the history of primogeniture did not bear out the truth of the statement.

Now what can modern science do to prevent these dangers to the mother and to the child?

This brings us to the treatment of the second stage of labor. Much can be done, and the proper care of the second stage is the crowning achievement of the modern obstetrician,—not the spectacular performance of Cesarean section. I will pass over with mere mention those things which are routine in the management of this period,—the practice of an aseptic technic, the administration of anesthetics, the watchfulness for symptoms of rupture of the uterus, of acute cardiac decompensation, of impending nervous exhaustion, eclampsia, abruptio placentae, and mechanically obstructed labor, all of which are sufficient to engross the whole attention of even the cleverest accoucheur,—and I will discuss particularly the preservation of the pelvic floor and outlet tissues, and the prevention of injury and death to the child.

The first prerequisite for success is the appreciation of the above described dangers; the second is their recognition in the individual case, then follows the application of our present knowledge of artistic delivery under the protection of a highly refined aseptic technic.

The question at once arises,—shall we depart from our old, trusty, time-honored "watchful expectancy," i. e. waiting for distinct signs of distress on the part of the mother or babe be-

fore interfering,—or should we anticipate these dangers and, as a routine, cut short the second stage by a surgical delivery?

The most radical apostle of early surgical delivery is Potter of Buffalo. In all cases, as soon as the cervix is fully opened, (and oftentimes before) he performs podalic version followed by immediate extraction. This practice has, and in my judgment, justly, evoked a storm of disapproval. In Potter's hands (perhaps, I am not sure), the operation is safe, but in less skillful hands there will undoubtedly be a long train of dead and damaged babies, ruptured uteri, and torn soft parts. The same may be said, though with considerably less force, to what I will recommend for the obstetric specialist,—the operation of "prophylactic forceps."

Most obstetric writers discuss the length of time one should allow the second stage to continue, and advise the use of forceps after a period of two, three or more hours. Others determine the time of interference by the signs of suffering of either patient, or by evidences of actual danger to either. It must be "watchful expectancy" until then, and, in spite of what I will say later on, I still believe this is the safer plan for the young practitioner, for the occasional accoucheur, for the family physician. Only I recommend as a much closer "watchfulness" so that the signs of danger may be recognized earlier than at present is the case. I still believe that "watchful expectancy" and natural delivery will give the best results in the conditions in which the vast majority of births occur, and that the indiscriminate use of forceps, of pituitrin and of forced delivery will do, as they are doing now, immeasurable harm.

As far as my own present practice is concerned, I may say that it is more active than formerly and that I make frequent use of the "prophylactic forceps." In primiparae and in multiparae with rigid pelvic floor, I shorten the second stage artificially. When the head has reached the pelvic floor and the levator ani muscles have begun to stretch, I consider the advisability of interference. If the pains are strong, a few extra whiffs of ether or gas are given and a deep episiotomy is made, in the manner about to be described. The patient will

then deliver herself, or if the pains lag, two or three drops of pituitrin are given. If the pains are not strong, or if the head reaches the pelvic floor after a second stage lasting longer than I feel it should, say 45 to 60 minutes, or if the rotation is not complete within this time, I do the surgical delivery or "prophylactic forceps." Under complete ether anesthesia, the pelvic floor is incised, the head rotated anteriorly, and delivery effected. Just after the head is brought out of the vulva, the patient is given 1 c.c. of Burrough and Wellcomes' pituitrin, hypodermically. In a few minutes the uterus contracts and expels the placenta into the upper vagina from which it is expressed by one hand exerting pressure on the fundus, the other hand being placed in the vagina for the placenta to slide on, in the manner that the heel slides down on the shoe horn. We call it "the shoe-horn maneuver." Immediately the placenta is delivered a full c.c. of aseptic ergot is given intramuscularly. It is remarkable how little blood the woman loses when the labor is treated thus, and I think much of the rapid recovery the women enjoy, is due to the preservation of their blood supply. Much, too, I ascribe to their freedom from the hard physical labor of the second stage.

As soon as the uterus has contracted well and the oozing has stopped, a careful palpation and inspection of the lower uterine segment and cervix are made. Cervix tears are repaired at once. The general notion of the pathology of cervical laceration needs revision. The cervix from embryologic, anatomic and clinical studies, is made of two plates of fibres and muscle tissue, united at the sides by thinner masses of the same fibres. Tears usually occur at the sides,—one or both, and the body of the cervical tissue retracts from the edges. Sometimes the mucous membrane, both inside and outside, does not tear, but the body of the cervix tears and months later we find a patulous os. These various mechanisms of cervical tear are shown in model No. 5. Only in exceptional cases and in tears of small degree, or when the cervix is edematous and is cut, do we find the flat surfaces to unite that are usually described in our textbooks. It is important to know these vagaries of cervix tears, because, unless they are recognized, and the suture

adapted to each particular, the union is unsatisfactory, and a good operation falls into disrepute.

The Perineotomy. This is one of the most important parts of the prophylactic forceps, because it is intended to preserve the integrity of the pelvic floor, the subvesical fascia, the urogenital septum and at the same time prevent injury to the child's brain. It is the main portion of the prophylaxis. I will assume that the operator knows his anatomy well. Just the right time to make the incision is not so easy to determine. I like to wait until the levator ani and fasciae have been stretched a little, but have not begun to tear. I have not yet learned how to grasp the correct moment in all cases. Better too soon than too late. Beginning at the raphe in the fourchet, the skin and urogenital septum are cut with one sweep of the scissors. This exposes the levator ani pillar. The perineum falls to the opposite side, its apex attached to the fascia over the rectum and to the edge of the levator ani. Next the vagina together with the fascia over the levator ani are incised. Be sure to recognize the fascia and incise it with the vagina. This bares the levator ani pillar as plainly as is the rectus muscle, in the pararectal abdominal incision. Then the levator is cut more or less extensively depending on the estimated size of the child. The cut is made almost horizontally in about the middle of the muscle. Bleeding is stopped by pressure with gauze sponges,—occasionally a vessel needs tying. For novices I recommend putting temporary sutures through the various structures, before cutting them, to render later identification easier, since sometimes the stretching of the wound by the head causes the muscles to tear away from their places in the fascia. In the repair we simply unite the parts in anatomico-surgical fashion. The vagina is closed with a running submucous catgut suture having a care to get the fascia over the rectum. With an extra rubber gloved finger in the rectum, puncture of this organ is avoided. Then the levator ani is sewed with 2, 3, or 4, 40 day catgut interrupted sutures, inserted also under the protection of the rectal finger. Next the urogenital septum is reunited by catgut—running 20 day catgut, and the end of this suture meets the end of the subvaginal suture at the

apex of the perineum. These two are tied together, eliminating one knot. Next a running suture of No. 0 catgut closes the fat and the superficial fascia and finally the skin is closed by a subcuticular silkworm gut, the ends being left long. Where there is a suspicion of infection, or a vaginal discharge, it is not wise to sew up the wound as here described. The vagina is closed with interrupted catgut sutures and the levator ani, the urogenital septum, and the skin all brought together with silkworm gut, figure of eight sutures, the first loop of the 8 grasping the levator, the other loop the septum and skin. Where infection exists, no suture is attempted at this time, but in such cases prophylactic forceps does not come into consideration. There are other indications to be met.

As regards the forceps delivery, one important injunction is needed. The standard rules apply. Especial care is to be taken that the child suffers no injury or asphyxia from an interference instituted to save it from both.

With the head stethoscope, soon to be described the condition of the child is narrowly watched from the beginning to the end of the operation. After the forceps are locked, the rate of the fetal heart is noted, then the handles of the instrument are compressed. If the heart is not affected or only slightly slowed, it means that the child is not endangered and the delivery may be accomplished without hurry. If the beat gets suddenly and much slower, the cord has been grasped by the tips of the blades. A reapplication of the forceps is demanded, or the delivery must be hastened. Before every single traction one listens again to the heart for the danger of shutting off the fetal circulation through gripping the cord must be avoided. There is room here for the exhibition of high obstetric skill. The amount of compression of the brain by the forceps should be the least necessary to hold the head securely. "With art, not with strength," saves the baby's brain; the head stethoscope and available obstetric measures prevent asphyxia.

Now, the writer freely admits that this method, the prophylactic forceps operation, is a radical departure from time honored custom and must have really sound scientific basis for recommendation. This it has. First, it saves

the woman the physical labor of a prolonged second stage, and in the modern nervous debilitated product of civilization, this is becoming more frequently necessary. The saving of blood, already referred to, has much to do with the quick and smooth recoveries I have observed in my cases. In the combination of morphine and scopolamin in the first stage, gas or ether in the second, with operative delivery, we have robbed labor of most of its horrors and terrors, and we ought thus to favor the increase of the population.

Second. It undoubtedly preserves the integrity of the pelvic floor the vesico vaginal septum and introitus vulvae and forestalls the long train of sequellae previously mentioned. I regret that I cannot show you some of the cases delivered in this fashion. Virginal conditions are often restored. Some might say that this is a disadvantage.

Third. It saves the babies' brains from injury and from the immediate and remote effects of prolonged compression. Incision in the soft parts not alone allows us to shorten the second stage, it also relieves the pressure on the brain and will reduce the amount of idiocy, epilepsy, etc. Prophylactic forceps also prevents asphyxia, both its immediate effects and its remote influence on the early life of the infant.

There is only one objection to the innovation and I regret that it is a real one,—but it will be, let us hope, only temporary. Prophylactic forceps will be made an excuse by unskilled, conscienceless accoucheurs, for the hasty termination of labor, not in the interests of the mother or babe, but for their own selfish ends. I fear that there are already too many such forceps operations, and therefore, I hesitated long before I decided to publish this method. But I have always felt that we must not bring the ideals of obstetrics down to the level of the general, the occasional practitioner,—we must bring the general practice of obstetrics up to the level of that of the specialist. Let us trust each man to do honestly according to his limitations. For the one, watchful expectancy, for the other, prophylactic forceps.

In closing, a few words regarding the value of the head stethoscope in discovering danger to the fetus. This instrument I devised follow-

ing a suggestion of my associate, Dr. D. S. Hillis, and it has many good attributes. It is worn on the head during the delivery and one can listen repeatedly, indeed, almost continuously to the child's heart with a minimum of effort. It obviates the need of an assistant to watch the fetal heart tones when the operator is scrubbed up. It aids hearing the sounds if the mother has noisy respiration, or the operator is a little deaf; it eliminates the humming muscle sound usually so annoying when the stethoscope is held by the hand; one can compress the tissues firmly and thus get nearer the baby's heart; the sense of hearing is aided by having bone conduction in addition to air conduction. The greatest benefit of the instrument, however, is the ease and comfort with which one can listen to the fetal heart. There is no excuse now for neglecting this part of the accoucheur's duties. All he has to do is to bend his head over the abdomen and he can learn all about the baby's condition. The heart is a good index of the suffering of the child. If the fetus is in danger of asphyxia, it will slow up or get faster, depending on the type of anoxemia. If the brain is being subjected to injurious pressure the heart will be alternately slow and fast, or irregular; if minute hemorrhages or larger hemorrhages occur in the brain the heart will get progressively more rapid. Irregularity of beat, abnormality of rhythm, variations in strength of beat all indicate that the child is suffering and apprise the accoucheur that something must be done. The field thus opened by the use of the head stethoscope has not been sufficiently studied, but we already have discovered many interesting facts and there is promise of more. The widespread use of this instrument will save many babies' lives.

DISCUSSION

DR. FRED L. ADAIR, Minneapolis: It has been a pleasure to listen to Dr. DeLee's very able and comprehensive paper, and it is likewise a privilege to discuss it.

I wish in the first place to make a few general remarks about pregnancy and labor as a pathologic process. Judging from the decline in the birth rate and the increase in the percentage of sterility and of small families, pregnancy is coming to be considered as a pathologic process and perhaps con-

traceptives and abortions are regarded as physiologic.

It is too bad the general level of obstetric practice has not shown greater improvement. The results should be very much better. It is true that maternal mortality has been lessened by precautions taken to prevent infection, but deaths from other causes have not been decreased so much and there is still far too much morbidity and disability as a result of childbirth.

If we consider stillbirths and the neo-natal mortality, we find that there has been practically no reduction for many years, while during this time there has been a very considerable reduction of infant mortality during the first and second years of life.

I wish to emphasize the fact that the reduction of the stillbirth rate, as well as the neo-natal mortality, is for all practical purposes an obstetric problem. The responsibility for saving as many of these lives as possible rests on the shoulders of those who should provide proper care for the mother and offspring during pregnancy, confinement and the puerperium.

Dr. DeLee has pointed out to us how some of these dire results may be avoided by a proper management of the second stage of labor. It behooves all of us to give heed to his advice. We should all recognize frankly that injuries to the pelvic floor are common, and that they occur frequently in the practice of all who have anything to do with delivering women. In my experience practically every primipara has more or less injury to the pelvic floor.

There has been an altogether too common teaching that it is possible to prevent lacerations of the pelvic floor, and that it is more or less of a reflection on the ability of the attendant to have a tear which it is necessary to repair. We should recognize that these injuries are common, that they should be repaired, and that it is a disgrace not to repair the injury to the best of one's ability.

It is well to understand that our civilization tends to make physiologic processes more or less pathologic. This is not only true of obstetrics but also of many other processes. It is a normal function to drink water but it is not so to drink contaminated water. It is not physiologic to eat some of the food which civilization provides for us and such a dietary is the cause of much pathology. We have to devise ways to thwart this conversion of physiologic into pathologic processes.

The operation of episiotomy is one of these means. It is made necessary because of a disproportion between the size of the head and the soft part, and because of a faulty relation between the expulsive powers of labor pains and the resistance of the pelvic floor. I have not time to discuss the many important points brought out in the paper, but I wish to say a few words especially with reference to

the indications for its performance. This operation shortens the second stage of labor and is in many cases beneficial to the mother as well as to the child.

How are you to detect dangers to the mother, and how are you to recognize danger to the child? Dangers to the mother from a prolonged second stage might be divided into those that are general and those which are local. General dangers are detected more easily through the heart and pulse perhaps than in any other way. This necessitates attention to the mother's heart and pulse.

So far as the local injuries to the mother are concerned, they comprise practically injuries to the pelvic floor during the second stage of labor. At least, they are the most common. There are other dangers which have been pointed out by Dr. DeLee. How do you recognize danger to the pelvic floor? By failure of the head to progress; it becomes stationary and more or less fixed on the pelvic floor. The tissue become tense, and by pressure on the tense tissue you find definite interference with the reestablishment of circulation in the perineum. You find that you have beginning edema of the perineum; then it is time to interfere for the sake of the local condition in the mother. You also find that the head recedes and comes down and if you find a little blood stain on the head which is due usually to a break of the mucous membrane of the vagina, it is an indication for performing an episiotomy. You should watch the perineum because it is being injured and gives a definite indication for operative procedure.

Unfortunately, all injuries to the pelvic floor are not accompanied by extensive lacerations, and not always by any laceration so that immediate diagnosis is not easy. We have injuries which are more serious as the result of very prolonged pressure of the head on the tissues of the parturient canal. This is recognized particularly by the condition of the parts of the mother, and also by the condition of the head. You can watch the scalp circulation as carefully as you can watch the perineal circulation. When pressure on the head with your finger fails to give a prompt response in the vessels of the scalp, that head is being subjected to a great deal of pressure. When the head is persistently cyanotic and there is beginning edema of the scalp, the child is not only in danger, but you also know the tissues of the mother are in danger because of the great pressure on them. Both of these can be relieved by episiotomy. We should follow definite indications in the treatment of this class of cases.

Of course, the fetal heart should be carefully watched as it gives the best indication of the condition of the child. We are all, I am sure, greatly pleased to have heard Dr. DeLee's excellent paper.

DR. WILLIAM H. CONDIT, Minneapolis: I surely feel highly honored in having the privilege of dis-

cussing such a scholarly and technical discourse as Dr. DeLee has given us.

The author made two marked impressions upon my mind as I listened to the many dangers attending the passenger, and the passages concerned in the birth of each new life. First, the tremendous odds against our safe arrival (especially the age in which most of us here arrived) hence, we should thank the Lord that we are all here (laughter). Second, the importance of the proper surgical repair of the damaged passages of the mother. Not many years ago my teachers taught me that the repair of the pelvic floor was an interne's job, pure and simple, and as soon as he graduated and took up his internship, he was assigned the operation and considered an expert after one good job. We surely have a different idea of the operation after this detailed description so graphically presented with the aid of Dr. DeLee's beautiful models. The damage to the passages is so much easier prevented and repaired than the injuries occurring to the passenger, especially those to the brain of the infant leaving permanent deformities to haunt us as very unpleasant memories of our part in the crime. I have one, not twenty-five miles from this city in which two decompression operations were necessary in a vain attempt to relieve a general spastic paralysis in a child nine months old. This case was the result of a stormy tetanic labor where surgical anaesthesia failed to relax the terrific uterine contraction that was pressing the life out of the child's brain. All possible was done in this particular case to prevent damage to the brain, but there are many who could escape, with proper care at delivery directed at relief of prolonged or stormy labors. Kearney estimates that intracranial hemorrhage at birth is responsible for 70 per cent of the spastic type of paralysis in children and 20 per cent of the resulting idiocy and feeble-mindedness now existing; he urges the importance of an examination of the eye grounds in infants after difficult labor. Of 1,387 children having spastic paralysis, of ages varying from one day to twenty years, 287 showed distinct edematous changes; 21 per cent showed distinct signs of increased intracranial pressure.

In the 287 treated by decompression operation the mortality was 10 per cent; nine were operated on the first day of life with one death; six were operated the second day after birth; three on the third day with no mortality in either. This for the surgical side. The preventive treatment depends upon—First: the skilled use of the stethoscope as Dr. DeLee has illustrated with his improved headpiece. It is very important that you have one to fit your own head and ears that you may be able to detect the foetal heart sounds clearly. If we can so develop and teach this art as to be able to make a diagnosis of brain injury by the foetal heart condition as Dr. DeLee says is possible, we have made remarkable advance. Second: we may assist the mother in her labor, slowing it if too stormy, by use of proper anaesthesia,

recognizing abnormalities of the passages, stimulating prolonged soft labors; third, by prophylactic forceps preventing the final fatal damage to a brain that may be mildly injured.

I am much encouraged to have Dr. DeLee give us this method he terms prophylactic forceps. I have been using this means of assisting the mother in her last, most severe suffering of her labor, but without publicity, fearing it might be considered meddling operating, but I have so far had no regrets, no infection, and shall continue this method with far less hesitation.

Finally, prevention of the continuing of a small brain hemorrhage by the subcutaneous injection of the blood of one of the parents of the child, preferably the mother's. This no doubt prevents many a fatal issue. We know the end results of these injuries to the vessels of the brain, namely, meningeal hemorrhages, small insidious and resembling pachymeningitis; a large hemorrhage suddenly fatal or small multiple hemorrhages organizing into permanent clots or causing cystic degenerations of the brain tissue. Since we cannot as obstetricians, become expert ophthalmologists, heart, or nerve specialists, or have a member of each specialty at our elbow, at each and every delivery; why not routinely use the subcutaneous injection of a small quantity of the mother's blood into every child as soon as delivered; if not in all, in those where the least suspicion of a brain injury appears.

This treatment can do no harm and might, by increasing the coagulability of the foetal blood, check instantly an unrecognizable hemorrhage.

DR DELEE (closing the discussion): Dr. Condit spoke of hemorrhages in the brain with hemorrhages in other parts of the body. Hemorrhages in the brain can be the cause of hemorrhages in other parts of the body. V. Herff has proven in animals that damage at the base of the fourth ventricle will result in hemorrhages of the bowel.

Dr. Adair spoke of labor as a pathologic process, but I could not gather whether he meant that considering it so would cause a slowing up or improvement in the birth rate. As a fundamental reason why obstetrics is on such a low plane, the fundamental cause of our high mortality, (and there is an unavoidable mortality in childbirth) and the fundamental cause of the present lack of improvement in mortality of the mother is the fact that the public does not recognize that confinements are pathologic. If labor were raised to a dignified plane in the eyes of the public, they would not permit midwives to practice obstetrics, but they would demand that the obstetrician or accoucheur be as well versed in his art and practice as any surgeon, and then we could hope for a reduction in our mortality and morbidity, but not until then. As long as labor is only regarded as simply a function that any old woman can attend to, just so long will our state legislatures refuse to

enact the necessary laws to prevent all these troubles.

THE SURGICAL TREATMENT OF BUNIONS*

By C. H. MAYO, M. D.,
Rochester, Minn.

The value of good feet is not appreciated until middle age when they are compelled to carry a greater weight than during youth and when new shoes must be fitted to the feet rather than the feet to the shoes as is the second and third decades of life when the feet have often become molded to abnormal types of shoes. Shoes are often too short or misshapen at the toe, causing the joint of the great toe to turn outward, and thus developing a hallux valgus. The deformity is in females in the majority of cases. A heel two-and-one-half inches high makes it necessary to walk on an inclined plane. This enlarges the sesamoids and at times even develops them under fifth metatarsal head.

Hallux valgus is a very common deformity in which the great toe overlaps or compresses the second and third toes (Fig. 1). It is often associated with some degree of bunion. Bunion, except of the bursal type, rarely occurs without hallux valgus. The overgrowth of bone (Fig. 2) on the inner side of the first metatarsal bone is immediately back of the articulation. This has been generally attributed to intermittent pressure; nevertheless in an x-ray picture of the foot with severe hallux valgus and deformity from bunion shows a wide space between the heads of the first two metatarsals (Fig. 3). If the growth of bone were due to an intermittent pressure bony deformities would occur in other regions subjected to intermittent pressure, for example on the shoulder of the hod carrier or beneath the collar of the work horse. Is this overgrowth a protection incident to the deformity, hallux valgus, and an effort on the part of nature to protect the exposed or lightly covered inner side of the articulating head? It is more probable that this overgrowth at the terminal whorls

*Presented before the Southern Minnesota Medical Association, December, 1919, Mankato.

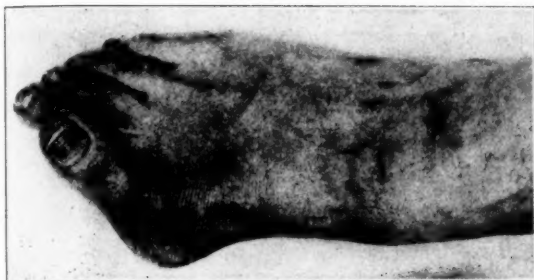


Fig. 1. Bunion foot.

of the capillary circulation where the joint capsule is attached to the periosteum is of the same origin as the overgrowth which occurs in rheumatoid arthritis, a mild chronic infection, the localizing factor being that of traumatism, since such growths occur and increase during the period of life in which rheumatism and recurring infections occur. The various shapes of feet and the limited number of shapes of shoes are undoubtedly responsible for the development of bunions and hallux valgus, conditions which occur more commonly in feet in which the great toe is longer than the second and third supporting toes, since the leverage action of the misshapen pointed and too short shoe turns the joint outward. Bunion rarely occurs on a foot whose great toe is shorter than the second and third toes, namely the square foot.

Flat-foot is a common deformity, either congenital or acquired. Persons of the colored race naturally have a low arch; the outline of



Fig. 2. Bony deformity in bunion.



Fig. 3. X-ray of foot with bunion showing exaggerated space between inner and outer metatarsal bones and displaced sesamoid wedges.

the imprint of a wet foot indicates that the majority of them are flat-footed. The claim is possibly correct that the negro has more of the fatty pad on the sole of the foot beneath the instep than the white man, and that the flat-foot in this naturally bare-footed race is more apparent than real and serves somewhat the purpose of the frog in the horse's foot. In later life flat-foot may develop from the breaking of the arch, or slow giving way of the arch, a condition which is associated with arthritis more commonly than is supposed, and which belongs to the period in which bunions develop. The complication of flat-foot with bunion is serious as recovery from operation is slower and the degree of benefit is much less than in cases without this complication.

Beneath the head of the great toe are the triangular sesamoid bones on either side of the flexor tendon. They are half an inch long and one-quarter inch wide. I believe Robinson is correct in his assumption that on displacement of the flexor tendon in hallux valgus the sesamoid bones slip to the inner side of the head of the great toe and become a bony wedge at each step, sliding the joint of the great toe inward. This change of position is definitely shown when the body weight is added at the time the x-ray is taken (Fig. 4).



Fig. 4. X-ray of foot with bunion showing lateral view of sesamoid.

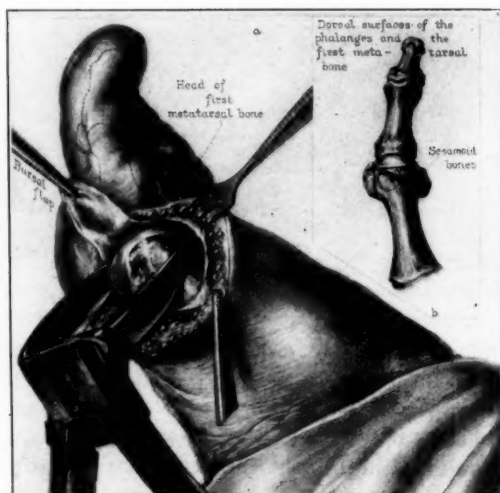


Fig. 5 (a) Removal of head of metatarsus. (b) Angle at which head of metatarsus is removed, showing short incision at right angle to long incision.

There are several methods, according to the condition, of the treatment of bunion:

1. Simple excision of the bunion bursa. Few operations are done in this early stage.

2. Excision of the bursa with removal of the inner side of the head of the first metatarsal.

3. The removal of all, or nearly all of the head of the first metatarsal. This procedure is too radical.

4. The Keller operation in which the bony growth with the bursa are removed. Tendon relaxation is secured by removal of the concave articulating surface of the first phalanx.

5. The Robinson operation for removal of the sesamoid bones, the bunion bursa, and by means of bone forceps, the removal of the over-growth of bone.

6. The usual operation performed for the relief of bunion is one I advocated many years ago for shortening the great toe and relaxing the extensor tendon; one quarter inch of the articulating surface of the head of the metatarsal bone is removed (Fig. 5) and motion is maintained by turning the bunion bursa into the joint in front of the divided bone surface after the removal of the bony overgrowth (Fig. 6). This was one of

the first arthroplastic operations devised for articulating joints to maintain motion after severe surgical traumatism. The operation has been most successful except in cases of marked flat-foot in which the pain of bunion is increased by a fallen arch complicated by mild arthritis. In such cases of flat-foot, hallux valgus, and bunion, I believe the head of the bone should be preserved, the bunion bursa, the overgrowth of bone, and the sesamoid bones should be removed (Fig. 7). If the hallux valgus is marked the tendon of the extensor hallucis longus is split for one-half inch over the joint and sectioned at the top on the inner side and at the bottom on the



Fig. 6. Suture to hold bursa in joint and straighten the toe.

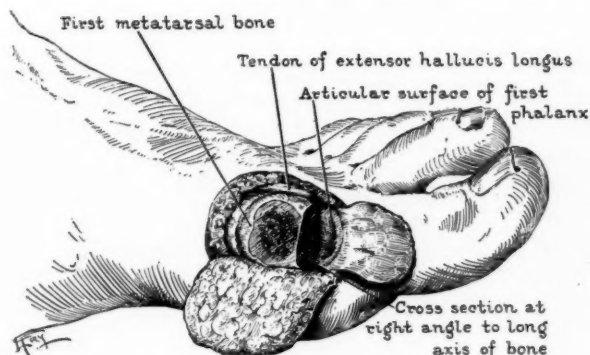


Fig. 7. Excision of bony overgrowth and part of the head of the bone with preservation of the bursa.

outer side; the divided split tendon is allowed to slip one-quarter inch and is resutured.

Persons with hallux valgus and normal or possibly lowered arches are operated on by making a curved incision convexly upward over the inner side of the joint. The skin is deflected downward, the bunion bursa is dissected forward and the joint opened, the bursa being left attached to the inner surface of the

first phalanx. One quarter inch of the head of the articulating surface is removed by bone saw or large bone-biting forceps. This relaxes both extensor and flexor tendons. The bony projection on the inner side of the head of the great toe is removed and the bunion bursa turned into the joint and held by sutures of catgut which also serve to straighten the great toe, thus removing the valgus. The wound is closed without drainage (Fig. 8). If the bunion is complicated by a marked flat-foot and

hallux valgus I believe that the Robinson operation of removal of the sesamoids is indicated; the incision is the same, and the bunion bursa with the bony overgrowth are removed. If the great toe is bent downward the white flexor tendon with the yellower surface of the sesamoids may be seen on each side of it. These bones can be removed with a knife or sharp pointed scissors if they are grasped with strong tenaculum forceps. In some cases of marked hallux valgus the extensor tendon should be lengthened.

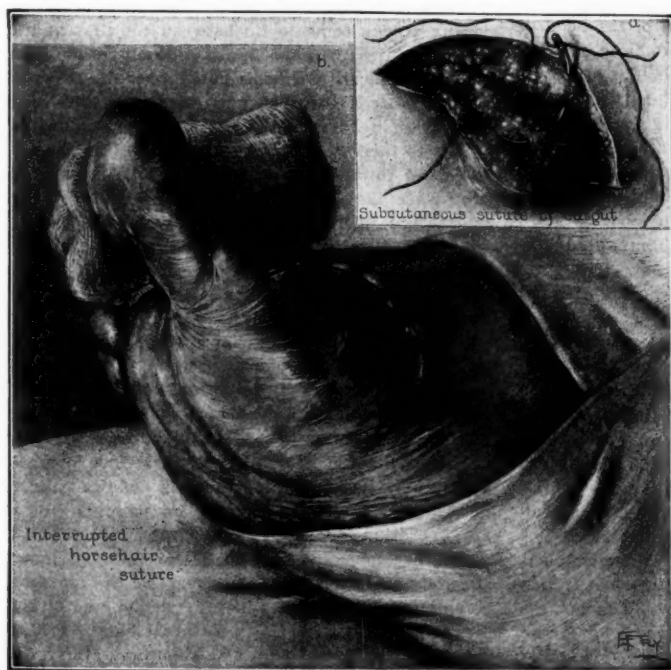


Fig. 8. Closure of the wound.

It should be explained to patients who have flat-foot complicated with bunion that they have an added trouble which will delay the relief ultimately to be obtained. The sesamoids and the articulating surface should not be removed from the same foot, and for the majority of patients the operation I described first is more satisfactory. Early use of the foot following these operations is indicated. The patients should be up early, and at the end of the first week, using the heel and outer side of the foot. As soon as possible, often within fourteen to twenty-one days, a stiff-soled shoe may be worn.

The operation is safe, easy of accomplishment, and the results are good. The operation should be advised more frequently. Advice should also be given with regard to the size and

shape of shoes to be worn following the operation.

It is to be hoped that the many surgeons interested in orthopedics as developed by the war will use their influence both on the manufacturers and the wearers of shoes to secure an improvement in the shape and length of shoes and thus aid in the prevention of many foot troubles which are wholly due to faulty fitting during early life.

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DISCUSSION

DR. A. R. COLVIN, St. Paul: Some celebrated surgeon has said that there is no such a thing as minor surgery, and the fact that Dr. Mayo undertakes to present a subject like this means that he considers the treatment of bunions an important surgical procedure.

There are four elements that enter into the consideration of bunions: (1) Deformity, (2) Bursitis, (3) Exostosis, (4) Arthritis.

The deformity known as Hallux Valgus is in the vast majority of cases due to the wearing of a narrow pointed shoe which forces the great toe outward. The bursitis is nearly always due to the shoes which produce pressure on the region of the head of the metatarsal bone, that is it is a traumatic bursitis, it may of course, be secondarily infected.

The exostosis is in time due to the irritating effect of pressure and the irritation of the overlying inflamed bursa, both of these causes acting upon the underlying bone stimulate osteogenesis and an exostosis results; a vicious circle is then established, the projecting exostosis exposes the bursa more readily to pressure trauma and the aggravated bursitis goes on stimulating bone production. The arthritis is due to faulty strain upon a deformed joint and the resulting irritation produces a hypertrophic condition of the head of the metatarsal bone.

The treatment of these cases must be based upon etiological and pathological considerations. Inasmuch as we are usually consulted regarding the established condition, a consideration of prophylaxis would seem to be unnecessary, but unless the patient is sufficiently impressed as to causative factors he will after operative measures have been undertaken reproduce both the deformity and the bursa. It has been said that "a surgeon is a physician who operates", this is even more true now than when it was said. Much can be done for bunions that is not operative, one sees occasionally a patient who is the subject of marked deformity and marked bursitis who is willing to wear shoes large enough to avoid pressure and who are thereby not cured of the de-

formity but they do experience complete relief from suffering and do not need operation. One may say that there are very few who cannot be relieved by wearing suitable shoes. The bursitis is in the majority of cases the cause of suffering, it is a very simple matter to remove it and if there is an exostosis this should be removed, this may be done in many instances without opening the joint. The deformity it must be remembered is not usually a cause of pain and need not always be corrected. If, however, there is as well a hypertrophic arthritis the deformity and the arthritis are dealt with by the same measure, that is removal of part of the head of the metatarsal bone.

Dr. H. W. Meyerding, Rochester: I believe we should limit the term "bunion" to an enlargement of the bursa over the head of the first metatarsal bone. This bursitis may be traumatic, giving rise to pain and may require excision, or it may become infected when drainage is necessary.

Hallux valgus, turning of the great toe toward the other toes, causes a prominence of the head of the first metatarsal which may or may not be accompanied by enlargement of the head of the metatarsal. The displacement of the great toe outward produces a joint incongruity, the proximal phalanx articulating laterally with the metatarsal head. This displacement of the phalanx carries outward the flexor hallucis tendons and sesamoid bones which are developed in them. The tendons in contracting tend to pull in a straight line. Thus the tendons of the great toe in the long standing cases of hallux valgus come to lie between the first and second metatarsal bones. This is a result rather than a cause of deformity. In this position, continual weight bearing forces them between the first and second metatarsal heads and the pull of these tendons only serves to increase the deformity by pulling the great toe more toward the other toes. This is especially true when the fore-foot is squeezed in modern shoes and forced to bear an excessive weight as with the high heeled pointed toe shoe. In such instances, it must be obvious that this displaced sesamoid crowded between the metatarsal heads would produce added pain and discomfort and if found impossible to replace it in its normal position after operation for the hallux valgus sesamoidectomy would be advisable.

Dr. Mayo devised an operation which consisted of partial removal of the head of the first metatarsal and insertion of a flap. This operation has given great satisfaction in our hands. I believe operation should only be done when there is definite pain and deformity. We do not operate on patients who desire operation for the cosmetic effect.

The postoperative care is of considerable importance. Immediately after the operation the toe should be splinted so as to keep it in extension, and straight forward in line with the metatarsal bone. Patients usually are able to be up and about, walking on the heel and outer side of the foot, in five to seven days. A proper shoe which allows the great toe to maintain

its normal position should then be fitted with a moderately high heel.

Practically all operations for hallux valgus, including the Robinson operation, remove the deformity and that deformity with its superimposed enlarged bursa, is, in my opinion, the principal cause of the pain and discomfort, although we must recognize that a displaced sesamoid lying between the fourth and fifth metatarsals, constantly irritating, can also be a factor in the production of pain and disability.

TUMORS OF THE GREAT OMENTUM*

By A. L. McDONALD, M. D.
Duluth, Minn.

Modern text books on abdominal surgery gives little or no consideration to primary surgical lesions of the great omentum. Judging from this and also from the infrequent case reports in the literature one would conclude that such lesions are exceedingly rare. However, when the surgeon is brought into contact with a large tumor of the omentum, he has ample food for thought. Following such an experience the author has made a study of the literature for information on the subject. He presents herewith his findings and conclusions for your consideration and discussion.

Personal case. A young man thirty years of age, recently discharged from the army as physically fit. History unimportant except that at the age of twelve he had an acute attack of right-sided abdominal pain with nausea and vomiting. During the past three years he has had occasional attacks of moderate pain and indigestion, but no vomiting. He describes a sensation of fullness in the abdomen and habitually avoids fats, pork, cabbage and large amounts of bread, as these cause indigestion. During the last year has had several attacks of diarrhoea with no apparent cause. Present attack began May 4, 1919, with sudden, severe pain in the lower right abdomen; vomited once after taking a cathartic; persistent pain till May 7 when he was seen in my office. Temperature, 99.2°, pulse 90, general examination negative. Abdomen full but not distended, marked tenderness and rigidity of lower right rectus. Patient was sent to St. Luke's hospital where the evening temperature was 100.2°.

Leucocytes 12,000. Urine negative. Diagnosis, acute appendicitis. Operation next morning, ether anesthesia. Incision in outer border of right rectus sheath, bloody fluid in peritoneum. Presenting in the wound was a grumous, friable mass which bled easily when handled. After enlarging the incision, it became evident that the mass extended above; nearly to the transverse colon, below to the pelvis, and laterally, from the outer border of the right rectus to the outer border of the left, but was surrounded by apparently normal, though thickened omentum. There were no adhesions either to the abdominal wall or underlying viscera. The mass was about one and one-half inches thick. The surrounding omentum was ligated with catgut and the diseased area removed, the opening being closed with catgut. The appendix was not recently diseased but showed evidence of previous inflammation. Convalescence was afebrile and uneventful. The patient returned to work after three weeks and was well when last heard from two months later.

The specimen was about the size of one's hand and consisted of fat with areas of hemorrhagic infiltration, and white opaque tissue resembling sarcoma. There was a tendency to fibrous capsule formation about the degenerated tissue. Sections through relatively firm tissue suggested a large, round-cell sarcoma. However, study of other sections and a review of some of the literature suggested a diagnosis of chronic inflammatory mass, with degeneration and infiltration of blood and connective tissue cells. The specimen was submitted to Dr. J. C. Bloodgood of Johns Hopkins who kindly made a thorough study and gave me his experience with omental lesions. Including my case, he has studied eighteen specimens which he classifies as follows: Cysts, seven cases; chronic inflammatory tumors, ten cases; and one, my specimen, which he diagnoses as sarcoma or chronic inflammatory tumor. He states that the microscopic diagnosis rests between an inflammatory lesion and sarcoma. The predominating histological picture is granulation tissue with great proliferation of endothelial cells of blood and lymph vessels, and he remarks that granulation tissue in fat is more difficult to differentiate from sarcoma than in

*Read before the Minnesota State Medical meeting, Oct. 1, 2, 3, 1919, Minneapolis, Minn.

any other tissue. He concludes. "If Dr. McDonald's case is sarcoma it is the first such primary lesion of the omentum" (in his collection). "In the microscopic study in the group of omental cysts and inflammatory tumors, we find areas very cellular somewhat resembling sarcoma but none so definite as Dr. McDonald's case."

There is so little in the textbooks on this subject that one is forced to work out his own ideas from the rather scanty literature. Growths of the omentum may be grouped as follows: 1. Secondary: metastatic cancer, which includes all cancer of the omentum; fibroids and cysts of other organs which have become adherent to the omentum. 2. Primary: benign fibroids and lipomata, malignant sarcomata, and the inflammatory or hemorrhagic degenerations.

Secondary tumors of the omentum are mentioned only because the older and many of the recent descriptions of primary growths, really refer to metastases or direct implantations of cancer of abdominal organs, particularly the ovary, stomach or bile-passages. Considering the development and structure of the omentum it is obvious that cancer as we understand the term can not originate in that organ. Certain clinical findings and physical signs given as characteristic of tumors of the omentum in the older descriptions^{1,2} are the results of metastatic cancer of the peritoneum, and in some cases involvement of the omentum was only incidental.

True primary tumors of the omentum can include only those which develop from connective tissue. These growths are rare. Murphy³ quotes Klebs that there were only fifteen cases on record at that date, 1905. Cobb⁴ states that the records of the Massachusetts General Hospital since 1870 give only fourteen cases of malignant tumor of the omentum and that twelve of these were metastatic cancer. Many cases of colloid cancer are mistaken for sarcoma. Textbooks describe cysts of the omentum as rare and usually degenerations of sarcomata (Hasbrook⁵). This is somewhat doubtful as Kenny and Mason⁶, Reynier⁷, and Bloodgood⁸, consider many of them due to hemorrhagic or inflammatory degenerations. Dermoids are even more rare. Cobb⁴ reports a case

of large round-cell sarcoma and refers in detail to one reported by Matas⁹ of myxosarcoma. Camus¹ refers to two definite cases and to two of "endothelial cancer," but with metastases in the liver and multiple nodules in the peritoneum, so it is doubtful if the last two were primary in the omentum. According to Camus, the endothelial tumors originate in the surface endothelium or from the lymphatics, but the primary localization of these growths in the omentum is not clear from his descriptions. In the omentum such tumors reach the size of an egg, accompanied by a massing of the structure into a transverse tumor extending across the abdomen below the stomach. The symptoms and signs are not characteristic. There is a latent period with a gradual increase in size of the abdomen, often with the accumulation of bloody ascitic fluid. The tumor is superficial, rather soft, and often not made out on account of thick abdominal walls. The intestines are forced to the sides but may to a certain extent underlie the mass, giving a comparative dullness on heavy percussion. The symptoms consist only of abdominal discomfort or embarrassed respiration due to the tumor and accompanying ascites. In some cases there was evidence of intestinal obstruction. I found no instance in which a correct preoperative diagnosis was made. Removal was attempted in Matas' case but recurrence took place within a few months, followed by death within a year.

I found reports of two cases of lipomata of the omentum, Camus¹, but it is by no means clear in the descriptions that these were localized in that structure. Some, if not all true fibroids are primarily from the stomach or colon and extend between the layers of the omentum. The only reference to such a tumor which I have found is that of Murphy³ which was in the gastrohepatic omentum. Another group of pedunculated fibroids represent fibrous thickenings of a portion of the omentum which has become twisted on a pedicle. One of these sometimes becomes detached thus accounting for a loose fibroid described in the abdominal cavity of hernial sacs.

There is a group of inflammatory or traumatic tumors of the omentum described in detail by the French (Brunet¹⁰, Reynier⁷, Bi-

ehon"), but to which I can find no recent reference in English. To explain the etiology and nature of these lesions, a consideration of certain points in the structure and physiology of the omentum will be of value.

The great omentum represents a folding of the two-layered posterior mesentery of the stomach, extending from the greater curvature of that organ in front of the abdominal viscera, being reflected to the level of the transverse colon where it fuses with the meso-colon. Originally composed of four layers, it forms a continuation of the lesser peritoneal cavity, a bursa in front of the small intestines, but later the layers become more or less completely fused. It has an exceedingly rich blood-supply from branches of the right and left gastropiploic arteries, which descend in the anterior fold to the free margin and are then reflected to the deep surface where they eventually anastomose with branches of the colica media. The veins accompany the arteries and empty into the splenic and portal veins. Injury to the vessels at the free border, from inflammation, irritation or ligation, is likely to result in thrombosis with extension, or to formation of emboli which may interfere with the circulation of portions of the omentum or be carried to the liver. The lymph supply is rich and allows for free absorption of peritoneal fluids or exudation of blood and lymph cells. The structure is covered with a single layer of endothelial cells, allowing free absorption or exudation. No epithelial tissue is present.

The function and physiology of the omentum is reasonably evident from a study of its structure. Older authors speak of it as a bursa preventing friction between the viscera and anterior abdominal wall. In this connection the omentum is normally important in preventing adhesions between the intestines and abdominal wall. On account of its free mobility, the omentum is forced into hernial openings by intra-abdominal pressure, thus tending to block such orifices and prevent intestines and other viscera from entering. Extensive endothelial surfaces together with a rich lymph and vascular supply provide for rapid absorption of peritoneal fluids. Also through adhesions and vascular anastomoses there is provision to relieve congestion in inflamed regions, or to take over

the circulation of adherent tumors which may lose their original attachment, thus accounting for certain pedunculated fibroids or cysts of the omentum. By reason of the rich lymphatic network, the omentum furnishes a large per cent of the lymphocytes or leucocytes in peritoneal exudates. Through the tendency to lymph formation the omentum early becomes adherent in response to local irritation or inflammation.

The inflammatory and degenerating masses in the omentum represent a reaction to irritation, sub-acute inflammation, or disturbed blood supply. The etiology is reasonably clear in certain cases: 1. Incarcerated hernia with omentocoele. 2. Torsion of the omentum with or without hernia. 3. Extension of low grade inflammation from an abdominal lesion, as appendicitis. 4. Thrombosis or embolism from such a lesion extending directly, or being carried in the circulation to the omentum. 5. Trauma to the abdomen with hemorrhage into the omentum. 6. Excision of portions of the omentum and disturbance in the circulation with thrombosis or embolism.

The resulting lesions present a wide variety of pathology: 1. Extensive changes in an omentocoele. 2. Results of torsion. 3. Extension of inflammation. 4. Effects of disturbed circulation, thrombosis, infarction, or hematoma. As already mentioned, there is a tendency for the omentum to be forced into hernial openings by increased intra-abdominal pressure, where it becomes adherent and incarcerated with a constriction about the neck of the hernia. Certain changes develop in the omentocoele with little or no clinical reaction. There is fibrous infiltration with overgrowth of fat. Rarely the blood supply is suddenly and completely cut off with resulting gangrene or abscess. More often the change is gradual and the ultimate stage is a fibrous tumor with some fat and frequently with small cysts. A few cases of detached fibrous tumors in hernial sacs have been described and originate from such conditions. The fibrous, infiltrated mass becomes adherent to the testicle and cord, at times extending into the abdomen forming a tumor mass of considerable size, especially when associated with torsion of the intra-abdominal portion. Now that hernias are usually operated on in the early stage, such conditions

are necessarily rare, but there are a few reports in the comparatively recent literature: Brunet¹¹, Camus¹, Reynier¹ and Bichon¹¹. Obstruction of the bloodvessels, especially veins results in varicosities, or rupture and hemorrhage into the tissue together with marked cellular infiltration. The final picture is extremely confusing. Some of the cases originating in inguinal hernial sacs were mistaken for malignant disease of the testicle, and only recognized when the mass was followed to the omentum with its attachment to the transverse colon (Brunet¹¹). Clinically these cases are comparatively latent for a long period, when there seems to develop an acute condition resulting from some change in the mass, as gangrene or inflammation. There is severe pain, abdominal distention, and sometimes fever and vomiting. In the tumor are to be found areas of hemorrhage with cyst formation, fibrous thickening, cellular infiltration, sclerosis of blood vessels, thrombosis, and often changes in the tissues suggesting sarcoma. It was after reading some of these descriptions that I was inclined to revise my original diagnosis of sarcoma in the case reported.

Intra-abdominal torsion of the omentum is discussed extensively in the literature: Brunet¹¹, Baldwin¹², Stewart¹³, Richardson¹⁴, Cullen¹⁵, Eitel¹⁶, Corner and Pinches¹⁷, Bubis¹⁸. In the etiology we have to consider: 1. Fixation of the free border of the omentum by (a) hernia, either incarcerated, or by adhesions about the ring; (b) adhesions to local inflammation, (Cullen¹⁵). As the result of such fixation, the arteries form a more or less resistant cord. Sooner or later there is disturbance in the venous circulation, with varicosities, or hematomata with thickening, and rotation occurs. 2. The formation of a mass or tumor in the free hanging omentum. Corner and Pinches quote experimental work of Payr, who produced gas cysts in the omentum and also produced masses by injecting paraffin, and found that torsion occurred spontaneously with no fixation of the free border. 3. Usually an acute provocative factor, as sudden effort, coughing or trauma.

Brunet speaks of three degrees of torsion: 1. Incomplete; constriction and narrowing of the vessels, especially veins, resulting in varicos-

ities, congestion, or hemorrhage. 2. Intermediate; more constriction, hemorrhage, fibrous and cellular infiltration. 3. Complete; (a) gradual with fibrous or hemorrhagic degeneration; (b) sudden, with thrombosis and gangrene.

Symptoms in all but the complete stage are indefinite: abdominal discomfort due to tension on the omentum and colon, possibly incomplete intestinal obstruction, constipation or rarely diarrhoea, and in some instances a mass can be made out. The complete picture will suggest torsion of some intra-abdominal organ, with severe pain, distention, rigidity, vomiting and often, fever. A common pre-operative diagnosis is appendicitis or intestinal obstruction, since the pain, rigidity, and mass is more evident on the right side. The true condition is rarely considered since it is not thought of. Treatment is surgical, usually excision of the mass, though in one case at least it was possible to untwist the omentum before gangrene occurred and correct the cause (Eitel¹⁶).

In all acute intra-abdominal inflammations there is marked tendency for the omentum to become adherent resulting in a walling-off process. Owing to the rich blood and lymph supply, the omentum is an active agent in overcoming and localizing such infectious processes. As a final result we may find one of three conditions: 1. Adhesions fixing the free border of the omentum and tending to produce torsion. 2. Chronic inflammatory changes in the adjacent omentum, resulting in fatty and fibrous degeneration; cellular infiltration; thrombosis often with hemorrhage producing a mass or cyst, and also tending to torsion. 3. Thrombosis extending in the omental bloodvessels or an embolus carried from such a local inflammation to some remote vessel of the omentum resulting in circulatory disturbance, infarction and infiltration, or varicosities, hemorrhage, hematomata, or cysts.

Trauma from irritation or ligation of vessels at the free edge of the omentum is known to produce extensive changes in some cases. Freeman¹⁹, in discussing omental transplantation advises; to avoid mass ligatures, to excise as little as possible and that as near the free border as possible. He speaks of the possible after effects and objections: 1. Loss of a struc-

ture which is possibly useful. 2. Lowered resistance to peritoneal infections. 3. Intra-abdominal adhesions of the stump. 4. Gastric or duodenal hemorrhage. 5. Focal necrosis in the liver. The last two conditions have been explained as due to emboli from thrombosed vessels at the border. Braune² reports five cases and states that such inflammatory masses usually follow laparotomy when portions of the omentum have been excised, or follow the reduction of an omental hernia when the mass was not recognized. One of Bloodgood's cases was an inflammatory mass in the stump of omentum which had been ligated three months previously at a hernia operation.

The symptoms are indefinite and not characteristic. There is history of longstanding abdominal distress, mild intestinal trouble, diarrhoea or constipation. Acute symptoms develop due to sudden change in the mass, circulator, disturbance or torsion. The tumor is often not palpable, but is superficial, having forced the intestines to the sides or covering them. Theoretically there should be a line of tympany between the mass and the liver, also below, but this is not constant.

Treatment is excision when possible though this may be extremely difficult on account of extensive adhesions. Incision and drainage of the mass or excision of a wedge-shape piece is said to promote absorption and cure.

To reconsider my case in the light of the findings and literature. While the gross and microscopic pictures strongly suggest the diagnosis of sarcoma, the various inflammatory and hemorrhagic infiltrations and degenerations can not be excluded. Furthermore true sarcoma is exceedingly rare, and I am unable to find any such case where recurrence did not promptly follow. It is difficult to explain the etiology of a degeneration in this case, since the mass was not adherent to any of the abdominal viscera, there was no torsion of the omentum, and there was no hernia. There was, however, definite evidence of previous inflammation in the appendix, and my only explanation is

Note.—A letter from this patient who is now in a distant city, describes what is undoubtedly an extensive recurrence. This fact establishes the diagnosis of primary sarcoma of the omentum beyond any reasonable doubt.

that an embolus from this region was carried and lodged in one of the omental vessels, producing thrombosis and a sub-acute inflammatory process in the dependant portion of the omentum.

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DISCUSSION

DR. ARTHUR T. MANN, Minneapolis, Minn.: Sarcoma of the omentum is a rather rare bird, and if this is a sarcoma which the doctor has reported it is a very unusual tumor. Sarcoma is a reversion of connective tissue of the embryonic type, and it grows—no one knows quite why it grows, but it continues to grow. Inflammatory tissue is a reversion of connection tissue of the embryonic type, and sometimes these tumors are very difficult to differentiate. There are some spots, as I see them, in this jelly-like sarcoma, but a sarcoma has an abundant blood supply. The blood vessels are intimately connected with the delicate stroma in which the sarcoma cells lie which form the framework over it, and they consist of clefts and spaces with the endothelium of the most difficult type.

In looking over this specimen one is struck with the fact that the blood vessels show a complete wall. The vessels are too well organized to be the vessels of a usual sarcoma.

We have the omentum enlarged in tumor masses from a good many causes, less often than a good many other tissues. The acute inflammations would enlarge it, and show inflammatory tissue. This tumor lacks that characteristic. It does not have the characteristics of a sarcoma and that sort of thing which suggests an acute inflammatory process which is about it. There may be a chronic peritonitis, but the most common condition is tuberculosis. We get the thickening of the omentum; it becomes thicker and thicker and gets shorter and shorter as it grows until it is a more or less sausage-shaped mass across the abdomen above the umbilicus, and with a tympanitic space between the tumor and liver which is of great diagnostic importance.

We have the secondaries from cancers and rarely from sarcomas. There is a thickening also in connection with the very much debated malignancy of the tumor of the ovary, the intracystic papillary tumor of the ovary. In some of these papillary adenomas the tissue grows through the tumor and presents in little bunches on the surface, and some of these become detached and float around in the abdomen, so that they may be spotted all over the abdominal wall and on the peritoneum, and in some of these cases there are comparatively large masses in the omentum which can be felt. My feeling is that this is an inflammatory tumor, and not a sarcoma.

DR. H. E. ROBERTSON, Minneapolis: There is one consideration that I think we ought to remember in regard to the tumors of any connective tissue structure such as the omentum. All we have to do to classify ordinary tumors that occur in such a structure is to classify the tissues, and we have many more tissues than the omentum and greater possibility for tumors developing. There are many more tumors which occur in the omentum than are described in the literature. The fatty tissue gives rise to benign lipoma, to secondary sarcoma, osteoma or chondroma, as all connective tissue and endothelial lined lymph spaces may give rise to cysts or endothelioma or anglioma of epithelial origin, and we have blood vessels which may give rise to blood angiomata. These are possibilities for primary tumors of the omentum. In addition to that, there is the extremely rare condition where bits of epithelial tissue are enclosed in the omentum from embryonic developmental times, and may give rise to epithelial tumors of the omentum, which are rare and remote, but a distinct possibility.

By looking at the lantern slides one cannot say whether this particular tumor is a sarcoma or inflammatory growth. When a man like Bloodgood has difficulty in differentiating from signs and slides a sarcoma from other tumors, far be it from me to differ from him.

DR. McDONALD (closing the discussion): I did not expect any one to make a real diagnosis from the slides shown on the screen. However, that is what we had to go by when the first slides were made without studying the literature. My first impression was a sarcoma when I got the sections, then as I got to thinking it over and looking into the literature of the subject, I came to the conclusion that sarcoma of the omentum, with a patient really recovering after a few months, was so rare as not to be thought of.

Dr. Bloodgood, who made a thorough study of the specimen and slides taken from various parts, made a statement in his letter that it looked more like sarcoma than anything he had studied. However, he said the differential diagnosis in inflammatory reactions in the connective tissue of the omentum was more difficult than in any other tissue in the body, and we know it may be very difficult in the simpler tissues. Therefore, his diagnosis of sarcoma was a tentative one on the ground that the patient had no recurrence.

There is a great deal in the literature on this subject; I found most of it in the French literature on inflammatory reactions and the causes. I had much more in my paper about tumors of the omentum than I was able to read in the fifteen minutes at my disposal. However, I think that the acute inflammations extending into the omentum will give an entirely different clinical picture from what we have here. For instance, there should be direct adhesions between such a mass and the primary inflammatory lesion. In this case there were not any adhesions of the omentum or any deficiency of any other structure.

Dr. Mann's point about the character of the blood vessels in the tumor will be confirmed by a study of the sections in detail.

Dr. Bloodgood in his remarks says that tuberculosis is not to be considered, as apparently the clinical picture is different.

In considering the causes of these inflammatory reactions we must think of them as being remote. Judging from a careful study of a number of cases and specimens, these tumors may occur as a result of injury to the free margin and apparent disturbance of the blood supply from ligation of the omentum.

Dr. Freeman in one of the issues of the *Annals of Surgery* in discussing resection of the omentum, speaks of the possible complications of thrombosis and extensive changes in the circulation. If a vein is thrombosed or occluded, we would expect to get a bunch of varicose veins with hemorrhage and the formation of hematomata. If it were an artery it would be an infarction with gradual infiltration. In my case I could not get the ordinary causes. For instance, there was no hernia in any portion of the omentum, and the omentum was not adherent. There had been no previous operation where the omentum had been interfered with. In casting about for a cause I was inclined to believe it came from a

thrombus which lodged in the omentum. That I think is the most probable explanation. Personally, I do not believe that it is a sarcoma, but it may be. I hope it is not.

WAR WOUNDS OF THE MAJOR JOINTS*

By ARTHUR AYER LAW, M. D.
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Experience with war wounds of the major joints in the Spanish American war and the Philippine Insurrection, profoundly impressed the writer with the extreme gravity and high mortality from this type of battle casualty.

Similar observations were made by our American army surgeons in Cuba and the Philippines, who universally reported that invasion of the synovial cavities of the large joints by projectiles was followed by an appalling mortality, frequent amputation or ultimate ankylosis of the joints involved.

These conclusions of our own army surgeons were later confirmed by the reports of British surgeons in the Boer war and by Japanese and Russian military surgeons in the Manchurian campaign.

The low power of resistance of the synovia to infection had long been accepted and taught, and all surgeons in civil practice had a wholesome respect for joints, and invaded the larger ones with an exceptionally careful aseptic technique.

The published observations of French, British and Belgian Allied surgeons from 1914 to 1916 added to the conviction of the extreme gravity of these wounds, for they reported a primary mortality of 27.6 per cent, amputation through the thigh in 30 per cent of the knee wounds, and a pathetically low percentage of ultimately mobile or useful joints.

Impressed with the gravity of these wounds, it was with interest that we studied them in France, first at the great French hospital center in Beauvais, where 16 evacuation hospitals were stationed; then in the American evacuation hospital No. 104; and later in our own Base Hospital No. 26, in the vast hospital center at Allerey, Saone et Loire.

Perhaps in no class of wounds has the change in treatment been so revolutionary when compared to our pre-war conception of the proper surgery of the articulations.

Late in 1917, Willems of Belgium and Delore of Lyons courageously broke away from the long accepted orthodox surgical procedures and inaugurated a new treatment of joint wounds which accomplished almost miraculous results.

It was the recognition by these surgeons of three fundamental underlying principles, which, applied to joint surgery made possible such exceptionally brilliant results. These were: first, early debridement and closure; second, recognition of the exceptional resistance of the synovia to infection; and third immediate and sustained free mobilization of the joint.

This treatment lowered the terrible mortality of 27.6 per cent to 0.9 per cent, reduced the percentage of thigh amputations from 30 per cent to 2.8 per cent and gave an ultimately more or less movable joint in about 85.5 per cent of cases.

Debridement changed completely the results of war surgery. This operation coupled with primary suture, or, failing that, followed by the Carrell Dakin treatment or dichloramin T. and later by delayed primary or secondary suture, enormously lessened the mortality, suffering and unhappy results of wounds: and what was as important, from the standpoint of military efficiency, it reduced the wastage of manpower by greatly shortening the period of convalescence, and permitted the more rapid return to their combat units of the 80 per cent of all the casualties which ultimately did return.

Allied surgeons recognized that all battle wounds showed contamination during the first eight or ten hours, but found that infection did not supervene until after this preliminary period and especially in wounds which had not been subjected to excision.

Early debridement, therefore, aimed to remove all foreign bodies carrying bacteria and all traumatized, infected or devitalized tissues, leaving the wound sterile and the healthy tissues, by virtue of their unimpaired vitality and inherent resistance, in the best possible condition for immediate repair.

When early excision and primary suture were done the ideal of battle wound treatment was

*Read before the Minnesota State Medical meeting, Oct. 1-3, 1919, Minneapolis, Minn.

reached; if debridement was late or followed infection, chemical disinfection was necessary, then when smears and cultures were negative the wound was closed by delayed primary or secondary suture.

In joint wounds then, debridement aimed to cut away all injured tissues, skin, capsule, synovial membrane, cartilage and bone adjacent to the tract of the missile, to remove lodged foreign bodies as well as bits of clothing or dirt and to leave the joint cavity clean.

Following this cleansing operation the synovia and capsule were closed and the skin sutured, unless the surgeon distrusted the wound, when he might leave a small capillary drain down to the parasynovial tissues, but never in the joint.

Probably many of the failures in the treatment of joint wounds in the earlier years of the war were caused by too late surgical relief and universal immobilization, for these cases were considered so serious they were evacuated directly to the base hospitals without operation at the front.

During the last two years of the war it was recognized that the best results were obtained by the earliest possible surgical intervention in the evacuation hospitals or autochirs near the front, the cases were held there as long as possible after operation.

Army surgeons had learned that the synovial membranes showed a more marked defensive reaction than most tissues; that they seemed even to possess a certain bactericidal power and long remained sterile. It was noted that while all of the wound, including the traumatized synovial edges, might be contaminated or infected, the synovial fluid remained sterile for as long as 60 hours before sepsis occurred.

Capitalizing this knowledge then; after the earliest possible debridement and complete closure of a joint the wound resolved itself into an aseptic injury of an articulation.

Given the knowledge of this definite interval when joint cavities combated infection and remained sterile, the wide open invasion of joints was possible, adequate explorations could be made while a great conservation of condyles, articular surfaces and bone fragments was attempted. It has been a surgical aphorism for

years that a wounded joint must early be put at rest. When Willems advocated immediate and continuous mobilization of these joints, his radical suggestions were contrary to all precepts, yet when coupled with early debridement and closure of the capsule it was responsible for the remarkable advance made in arthritic surgery.

Willems insisted that active movements of the joints must be begun as soon as the soldier awakened from his anesthetic and that the movements must be active and complete. In the case of the knee and ankle, if the statics of the joint were not interfered with by too great a loss of articular surface, the man must walk by the second day and continue to walk through his convalescence.

These active movements, if started very early, were not painful, and the patients were taught to initiate and execute them as soon as they found how little discomfort they caused.

When a closed joint became distended with blood or fluid, its mobility was lost from distension and shortening of the capsule, yet when aspiration relieved the distension, mobility was immediately regained. Frequent aspiration, then, was indicated in distended joints.

Early in 1918 it was the custom of many French and American surgeons to flush open joints with either and to leave them filled with that fluid when they were sutured. This practice lost favor when we learned that the joints did fully as well when they were left clean and dry.

Fractures invading or within the joint, of course modified the treatment. In the knee, we learned that if half of a condyle or half of the articular plateau of the tibia was left after the toilet of the wound, a useful joint might still be expected; again, we learned that loose fragments of condyles or articular surfaces in the knee and elbow, after proper cleansing, and in sterile joints, could frequently be nailed or screwed back onto the shaft and would survive as literal autogenous transplants.

In one French evacuation hospital we were shown serial radiographs of a knee which had been conserved after the loss of three quarters of a condyle, and which showed at the end of a year the regeneration of most of the lost bone.

This joint had been saved by patient conservative treatment. These French surgeons verified their observations upon the human subject by experimental work upon dogs, this work being done during overcrowded months, within sound of the guns and while they were constantly subjected to night raids from enemy bombing planes.

The loss of bony contour in the elbow was not so serious as in the weight bearing joints, for this loss virtually resolves itself into a partial resection and a good functional result might be expected with little deformity beyond the loss of the carrying angle.

In the weight bearing joints, especially the knee, excessive loss of a condyle or of the tibial articular surface, invited a bowing or angular deviation from lack of bony support. Yet the temporary use of a Thomas splint hinged at the knee gave surprisingly good end results, for the muscles contracted, tending to overcome the deformity and hold the joint stable. The joint capsule and ligaments as well contracted and helped combat the tendency to angulation. If the crucial ligaments were intact and three quarters of the articular surfaces saved, a useful joint might be expected.

In the knee or ankle where there had been extensive loss of bone, or where fragments had been nailed in place, the soldier could obviously not walk but had to be treated with active mobilization in a hinged splint until the fracture united.

In joints where great fragmentation had occurred, the vulnerating missile had already practically done a resection and the surgeon simply completed it. Yet the attempt to conserve shattered joints give such good results that the method was generally tried before resection or amputation was resorted to. Where the popliteal vessels were lost an early amputation was imperative.

Surgeons have long recognized that distension of a joint shortens the capsule and resulted in grinding of the articular surfaces together. This coupled with immobilization invited the formation of synecchia and ultimate ankylosis. Before the war we had learned to treat these joints by repeated aspirations and extension to combat this tendency; we had learned as well, that open drainage and immo-

bilization of a septic joint tended to loss of function from ankylosis; therefore septic joints which must be drained to save life, were looked upon as lost joints.

After great battles with enormous casualties, where it was humanly impossible to early evacuate all the wounded, many of the joint wounds were septic before they came to the operating table. Following Willems suggestion, these septic joints were treated by wide open incisions, debridement, cleansing of the joint, removal of loose bone fragments and foreign bodies, and flushing of the joint cavity with ether or normal salt solution, after which the joint was left wide open and active immediate mobilization inaugurated. Here active movements were, if possible, more important than in the aseptic joints, for it is difficult to properly drain all the pockets of an immobile joint, whereas active motion mechanically empties them.

At first it hurt our surgical conscience to see pus spurting from the wide open wounds of a septic knee when the leg was actively flexed and extended, yet Willems treatment in these cases was life saving and gave the best assurance of mobile joints.

Where, heretofore, infection of a great joint often presented a picture of profound sepsis, with the advent of this treatment the great oedema and inflammatory reaction was absent while the soldier had none of the characteristics of serious infection.

With the wounds of joints there was frequently extensive involvement of muscles and other tissues, which called for suture, autoplasty or the sliding of pedicled flaps to repair loss of tissue, in addition to the treatment of the joint lesion itself.

When the patella had been extensively comminuted it was occasionally necessary to do a subperiosteal resection of that bone.

Perhaps the most serious type of articular wounds were those in which the joint was involved along with extensive comminution of the shaft of one of the long bones. These fractures were generally infected and in spite of the most radical treatment were the type responsible for the largest proportion of amputations and caused the greatest mortality.

Knee joint wounds complicating compound

comminuted fractures could sometimes be treated with active mobilization when the fracture itself was immobilized by ice tong extension and with the leg suspended in a Hogden or Thomas splint.

Wounds of the hip and shoulder joints, because of their anatomical construction and peculiar function, had to be more frequently resected than all the other joints combined.

With this great mass of material studied by so many observers from various angles during a period of four years "over there," it was inevitable that the study crystallize into the definite conclusions reached. If we will profit by these lessons learned in joint surgery during the great world war and apply them to civil operative procedure, the surgery of articulations will find its standardization as firmly established as has the surgery of the abdomen, breast or inguinal canals.

DISCUSSION

DR. JOHN C. STALEY, St. Paul: It seems that the most striking feature of Dr. Law's paper relates to his statement of the great reduction during the course of the war if joint infections and the consequent lowering of mortality as a result of joint injuries. I think however that the statistics quoted are from the French and British rather than A. E. F. records. As the reports of work done in American Hospitals are completed and sent out the figures are not quite so good as those quoted. This difference in results is no doubt due to the conservative debridement of joint wounds by us during our early work in France. The French and British had learned well the lesson of early and radical debridement before we entered the war. At first their early treatment of these wounds was a swab of iodine and a bandage. The result following that line of treatment was so bad that Prof. Roux of Lausanne advised amputation or resection of all infected knee joints having any bone involvement. After it was found that early and thorough removal of injured tissue would prevent infections the French surgeons became radical and remained so. They were not satisfied with the simple removal from a wound of small pieces of loose bone but any bone which showed discoloration, indicating hemorrhage areas was chiseled or gauged out. The American surgeons were not quite so radical but I believe they were coming to that.

Dr. David of Chicago has recently reported 55 cases of knee joint injuries treated in Base Hospital No. 13. Of the 55 cases 24 were infected or a percentage of about 44. I think the work done in that Hospital can be considered fairly typical of that done in the best A. E. F. hospitals.

We had yet to learn to be radical enough in the removing of injured bone at the primary operation and this fact no doubt will account for the differences in statistics which will appear later. I believe that emphasis should be placed upon the point that injured bone should be removed just as radically as injured soft parts. It is not so easy to do but if a wound is thoroughly explored all hemorrhagic bone which might harbor infection can be discovered and removed.

DR. HARRY ZIMMERMAN, St. Paul: As Dr. Law says, the tolerance of major joints to infection was a revelation to us all. The knee joint, which has always been a *bete-noir* to surgeons, apparently tolerates infection very well.

A small amount of infections is usually quite well taken care of, if infections are not associated with the presence of foreign bodies. All foreign materials behave as irritants and should be very carefully removed. The entire tract of the missile should be excised and this done in such a way as to leave no devitalized fragments of bone and, if possible, in such a way as to leave no dead space after the ultimate closure of the joint. The synovial membrane should be closed first, then the capsule of the joint with the lateral expansions of the quadriceps and other muscles that overlie it, as a second layer. If the skin has not been seriously injured, it is well to close that also and always with interrupted sutures sufficiently far apart to allow escape of serum. It is important to have proper hemostasis before the wound is closed.

It was our habit, at Evacuation Hospital No. 5, before closing the joint, to wash it out with ether. Unless there is a definite joint deformity no effort is made at an immobilization. Dressings were applied and the patient encouraged to move the knee. It was remarkable that a great many of these joints got well without infection. The exact percentage of them I am unable to say but I should put it well over seventy per cent.

A great many cases were infected and a great many of these eventually became useful joints after following the treatment devised by Willems. Every Base Hospital received many cases of seriously infected joints wherein Willems treatment produced no good results and in which some radical procedure would have to be done in order to save the patient's life.

When we returned to the Base Hospital, there were several knee joints badly infected in which the Allis treatment was unsuccessful. These patients were profoundly septic and some died even after amputation.

The thing that is so distressing in knee joint infections is the peculiar extension of the joint cavity even after the joint has been freely opened. It was not unusual to find the cavity of the sub-femoral bursa extending half way up the thigh beneath the quadriceps extensor muscle. Very often

the joint capsule extended posteriorly up the posterior surface of the femur for a great distance. Because of the fact that these joints had been opened, there was very little change from the normal contour. When one sees such a joint, except for the incision on either side of the patella discharging some pus, it does not give one the impression that it is irreparably diseased and, except for the profoundly septic condition of the patient, it seems a shame on first sight to amputate such a leg. We also found that the mere installation or irrigation of any antiseptic solution, even the more recent chlorine products, produce absolutely no good. The Willem's treatment in this stage of the disease was impossible as the joints were so painful that they could not be moved and the patients were so septic that they had not the strength to move them and as for getting them out of bed, this was absolutely impossible.

There is room for a great deal of investigation in major joint surgery. Advances have been made but we still will see, even after the most careful application of the principals laid down in Dr. Law's paper, a great number of knee joints that will go on to amputation of death from sepsis. I am sure that these cases were our greatest trials at Base Hospital No. 26. A great many of these patients very soon developed metastatic foci so rapidly that even amputation was not warranted.

DR. F. A. DUNSMOOR, Minneapolis: I have been wondering what results we get when we are pushed into corners and have to fight. This is not really as new as it sounds from Dr. Law's paper, because it happens that, as old as I am, I can go back from memory when I was under Dr. Hamilton, who was then chief surgeon of the Army at the time of the Civil War. I was his pupil and walked the hospital wards in 1873 and 1874. Dr. Hamilton did not know as much about antiseptic work then as the men who have followed a long time since, but he did know this thing, that joint surgery, in the first place, had to be clean, and next the joint should be kept in motion where it is possible to do so. If you remember, he used very plain splints. The men who were associated with him advised the old Day splint, which is particularly useful in fractures in connection with the elbow joint, and the traction was to move this ratchet so as to straighten or flex the joint every day while the fracture was being treated.

The late lamented, Dr. Murphy, talked about these wounds which complicated joints, and he said plainly that those joints which were permanently drained were stiff joints, but those which were clean, no matter what operation was made, closed with good results and motion was kept up. Following the line of thought of men who are so widely apart as Dr. Hamilton, in time who had many, many long years of experience, and my observation of Dr. Murphy for only a short time, I have had the opportunity of seeing many of those principles carried out. When forced into such a calamity as the war Dr. Law has

had the experience of association with great men, and this coupled with his own dexterity and ability and the government behind him, which was lavish in every particular, to do the work, he was forced into a corner, and with the Dakin and other solutions he was able to accomplish excellent results, and the lesson which is brought out at this time is to apply that which has been proven.

DR. CHARLES A. REED, Minneapolis: Dr. Law in his paper certainly brought out the good points in connection with the Willem's treatment, but I am afraid some of us have not found it quite as simple to apply in these frankly purulent knees. The knees that came to us in the base hospital were mostly those that we closed at once, or had been cleaned out and were closed, and we had wonderfully good luck because those that got back to us, so far as I saw them personally, we were able to keep closed. They stayed closed by the mobile treatment and we got good motion. But in those which could not be closed, in which the destruction of the joint was so great that the surgeon who debrided them could not close them, it was another story. Almost all of them came back, as Dr. Zimmermann has said, when they were septic and some of them profoundly so. Any attempt to move these knees was almost out of the question; they were exquisitely painful. It may be that Dr. Willem's was able to move them but we could not. We were up against it. The knee joint is a tremendously difficult structure to drain. The lateral ligaments fit the condyle so tightly that you can scarcely put the blade of a scalpel between; you cannot get down between the joints because the lateral ligaments hold the joint in close approximation, and the large pocket behind cannot be drained with the patients on the back. Of course, you would naturally say turn the patient on the face, but that is practically impossible because of the pain. There were a good many of these cases in which excision was resorted to; we also cut the lateral ligaments and put the knee up in an acute angle position with the joint wide open and the condyles and head of the tibia sticking out and in spite of that there were cases that had to be amputated, the moral of which is simply that the Willem's treatment must be kept up from the first. You cannot have the lapse of two or three days and allow the patient to become profoundly septic and the knee frankly purulent and expect to get good results. We could not get them under such circumstances.

DR. LAW (closing the discussion): The statistics I have given were frankly taken from the British and French Service. Colonel Staley and myself were impressed with the extremely radical methods resorted to by the French surgeons. The American surgeons never felt it was necessary to be as radical as the French surgeons learned to be.

Both Dr. Reed and Dr. Zimmermann have spoken of not using this method of treatment in the late cases. I should have stated in my paper that this

treatment is to be initiated early. Dr. DePage, of LaPanne, Belgium, who has had a large experience with these cases, was privileged to serve in a section almost immediately behind the front line. Many of the evacuation hospitals were so situated that they could institute treatment immediately. Some of the evacuation hospitals, after the great drive in July a year ago, could initiate this treatment early. I want to emphasize the fact that this treatment must be instituted almost at once. I said "let them walk on these legs immediately they come out of the anesthetic. Some of the evacuation hospitals could not keep patients for ten days or two weeks, but they recognized the fact that if the principle of the greatest good to the greatest number was to be carried out, these joints must be immobilized in some splint. You see the object of it. When the joints were immobilized for two or three days, when that man gets back to us in the base hospital, his wounds were of such a nature as to preclude the possibility of giving him the Willems treatment properly. This ideal treatment has changed the mortality very materially and made it possible to give these men useful joints by early initiating this treatment in an evacuation hospital up close to the front.

I was very much interested in what Dr. Dunsmoor said about the Hamilton splint and its use in fractures of the elbow joint. Undoubtedly Dr. Hamilton got a good percentage of mobile elbows.

Dr. Zimmermann referred to distention of the capsule in shortening the capsule. Dr. Murphy brought this out years ago and said that distention of the capsule causes lateral enlargement of the capsule; that the capsule is only so long, and if you distend it laterally you shorten it longitudinally. He put on extension, and aspirated the joint to relieve distention because this distention shortened the capsule, and ground the articular surfaces of the condyles of the femur against the tibia, inviting adhesions and ankylosis.

I wish to thank the members for their discussions.



A MODIFIED INGUINAL HERNIA TECHNIQUE*

By GEORGE EARL, B. A., M. D., F. A. C. S.,
St. Paul, Minn.

What is the reason for recurrence of inguinal hernia after operation? Statistics on the question from army camps show such a wide variance that it is creating a new interest in the question of the technique of this operation. Surgeons like Bloodgood of Johns Hopkins and Torek of New York have written recently on the subject.

Comparative anatomy shows that inguinal hernia is more frequent in man than in the rest of the mammals taken as a whole. Williams of the Veterinary Department of Cornell University says regarding scrotal hernia in animals "Like umbilical herina it is uniformly congenital Gravity may aggravate either. It is due to an arrest in the development of the embryo by which the inguinal ring fails to narrow sufficiently to prevent intestine or omentum from slipping down alongside the spermatic cord. Physiologically, the inguinal ring remains open throughout life. Accordingly the hernia may vacillate, absent at one time, present at another, but the basic defect in the narrowing of the canal is permanent. So adult males supposedly free from hernia occasionally die from strangulated hernia following copulation." In the pig, scrotal hernia is common, and veterinarians tell us that the ring is very short and direct and that a rather simple castration cures almost without recurrence. Scrotal hernia is not unusual in the stallion and also in the ram. These species are rather the exceptions that prove the general rule of infrequent inguinal hernia in mammals on all fours. They are more prone to umbilical and ventral protrusions, because these portions are more dependent and also more liable to injury.

Erdman says, "It is not without meaning that the child first creeps and assumes the upright position only with a great deal of effort." With the erect posture the oblique or horizontal line of the inguinal ring is transformed into a vertical one. Standing tends towards a visceroptosis, placing an unnatural strain on the

*Presented before the Southern Minnesota Medical Association, December, 1919, Mankato.



Fig. 1
Incision thru skin deepening external oblique

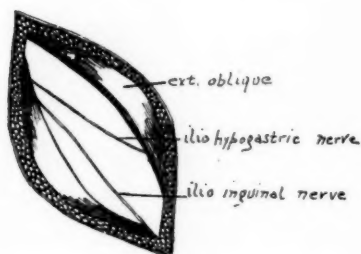


Fig. 2
Nerves to be located and avoided

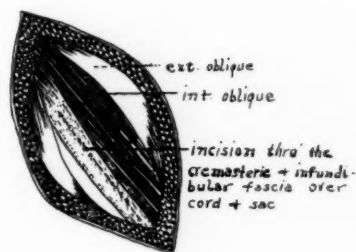


Fig. 3
Incision thru the cremasteric and infundibular fascia over cord and sac.

attachments of the abdominal organs. Without a visceroptosis the presence of an open inguinal ring might have no ill effect, as normally the mesentery should hold the bowel either large or small and also the omentum away from the canal. Visceroptosis, however, is always present and sometimes to a marked degree and together with the strain of gravity, the intra-abdominal pressure, and the action of all the abdominal muscles, give one a direct reason for hernia. It is interesting to note that it is practically only the mammals that have the diaphragm. The birds are free from the force of this powerful muscle there thus being greater room for play and distribution of force and less direct strain.

The general action of the muscles of the inguinal region is a backward and upward pull. These muscles have a purchase in Poupart's ligament and the pubic bone. It would seem reasonable that the action of the muscles and fascia should be preserved as far as possible. This means that the fascial attachments, especially their insertion in the pubic bone and Poupart's ligament, should be disturbed as little as possible; also that if they are altered there should be as complete a restoration as possible. If the fibers of the internal oblique cannot easily and securely be approximated to Poupart's ligament and if we have a weakened conjoint tendon, the device has been used of severing the rectus by cutting above or below and pulling that down to fill the void. There is no doubt that the muscle tissue is of prime importance. In suturing a perineum, which is quite an analogy, we aim by all means to secure muscle tissue for approximation; so it has become a recognized principle that in inguinal hernia, we should aim to build our closure on

the internal oblique, the conjoint tendon, and the rectus muscle.

In the perineal operation we also aim to secure accurate and complete fascial approximation, so too, in the hernial operation it has become recognized that the fascial covering is of importance. There are those who advocate transplanting a portion of the fascia lata in certain types or putting a portion of the external oblique under the cord and directly suturing to the internal oblique. No doubt many at times have placed the entire external oblique underneath the cord, suturing first the lateral portion to the internal oblique and then covering the whole with the mesial flap, giving, in addition to a firm muscular closure, a strong fascial reinforcement. I have been unable to find as yet any one who has advocated this technique as a routine. I feel that by placing the entire external oblique underneath the cord and quite forgetting the cord in the suture of the muscles, one can devote the entire material to a proper closure of the lower portion of the inguinal canal. If the external oblique is to be used to cover the cord or a portion of it, one must consider the formation of an external ring and consequently may neglect to fully emphasize the importance of a complete repair of

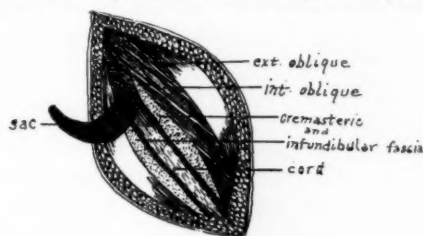


Fig. 4.
Separation of sac from cord

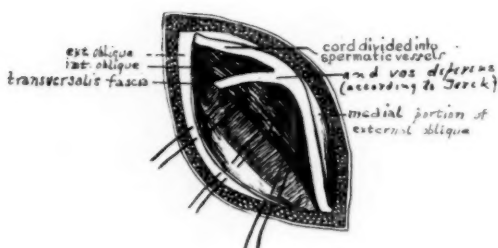


Fig. 5
Stitches bringing the internal oblique to
Poupart's ligament



Fig. 6
Dissection of external oblique to internal oblique

this weakest portion of the abdominal wall, i.e., the lower portion of the inguinal canal, the triangle bounded by Poupart's ligament, the pubic bone, and the musculature of the rectus and internal oblique.

If the sac is properly dissected from the cord and blood vessels, there is very seldom a recurrence in the region of the internal ring, and if there is a recurrence it is usually small and practically never gives any symptoms. Torek's technique at the internal ring of separating the vessels and the sac and keeping them apart, is undoubtedly a real advance, and if properly executed handles the indirect hernia satisfactorily. The region of the external ring, however, brings up the question of a direct hernia and it is this hernia that is often over-looked, the more so because we often have to deal with indirect inguinal hernia and direct inguinal hernia at the same time, two distinct abdominal weaknesses.

In a direct hernia, if we do not transplant the cord, we have left a weakness of the abdominal wall, smaller in size, but at exactly the same place. Ferguson's operation has done an immense amount of harm because it has influenced many to follow a technique of not transplanting. Bloodgood** says, "When I first transplanted the rectus in order to suture it to Poupart's ligament and thus strengthen the defect in the lower angle of the wound due to the obliteration of the conjoined tendon, I also transplanted the cord and excised the veins as in the Halsted operation. Since my publication in 1899, we discontinued to transplant the cord and rarely excised the veins, and when this rarer type of inguinal hernia presented itself, we continued the method of

transplantation of the rectus, usually with Halsted's modification of transplanting its sheath, but we did not transplant the cord. As far as I am able to ascertain, in the group in which I had transplanted the cord, there has been only one recurrence, but since the change in technique of leaving the cord undisturbed in the lower angle of the wound, I know of at least four recurrences in operations which I performed myself, and it seems strange that this made no impression." Torek** says, "Below the vas suturing of Poupart's ligament to the internal oblique and transversus muscles and often to the rectus muscle is continued all the way down to the insertion of the pubis. This is of importance in order to avoid recurrence in the shape of direct hernia, as well as for the repair of one already existing."

I have never found any functional or anatomical objections to placing the cord completely over the external oblique. This modified technique covers the cord only by the superficial fascia and skin from its exit at the region of the internal ring, but it is covered by nothing else as it goes over the pubic bone, a far more exposed region. There is less liability for strangulation of the cord, than where a new external ring is to be formed from the external oblique.

I have only had an opportunity to test this routinely in a series of forty-two cases. In ten a double operation was performed. This was over a period of two years and while we have endeavored to follow up the cases, perhaps an insufficient time has elapsed. Yet the fact remains, as evidenced from the army camp experiences, that in the great majority of cases if there is to be a recurrence, it comes very soon.

**Annals of Surgery, Vol. 70, No. 1, July, 1919.

**Annals of Surgery, Vol. 70, No. 1, July, 1919.

SURGICAL SHOCK*

By SAMUEL C. PLUMMER, M. D.
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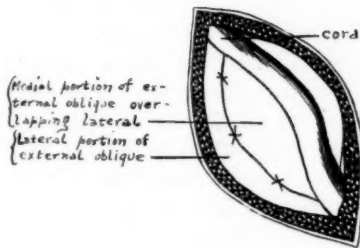


Fig. 7
Overlapping of external oblique

We have had reports from thirty-eight of the cases operated and none of them have complained of pain from the lessened covering, and in those who have reported there have been no recurrences. This senses immediately the justifiable criticism of any routine operation and that each individual case is a law unto-itself. An effort has been made simply to establish any functional or anatomical objections to using this modification in the majority of cases. I purposely avoided the discussion of suture material and different methods of placing the stitches, because, undoubtedly, this is all secondary to such considerations as tension. Many advocate at least one unabsorbable suture in the lower angle if there is evidence of strain. The necessity of avoiding injury to the nerves of this region is mentioned in all descriptions of the operation. The accompanying slides demonstrate the technique employed.



Fig. 8
Suturing pad of fat and fascia over the cord.



Surgical Shock is a subject of great interest to everyone who does surgery. Those who do traumatic surgery often have their patients come to them in a condition of surgical shock, while those who do not do traumatic surgery still have to consider the matter of surgical shock as a result of operation.

During the last fifteen years or more many physiologists have done a great deal of experimental work trying to ascertain the real cause of shock. It is desirable that this be learned if possible because any course of treatment of any condition rests upon a much surer foundation if the actual cause of the condition is known. It is true that we have worked out from clinical observations a rather satisfactory treatment of shock without knowing the actual cause just as we learned from clinical experience that quinine was beneficial in malaria and mercury in syphilis long before the plasmodium of malaria or the spirochete of syphilis was discovered. However, the treatment of both these latter conditions was improved with the discovery of the cause and no doubt improvement in the treatment of shock would result from the discovery of its cause.

Arriving at the ultimate truth in matters involving the complicated physiology and physiological chemistry of the human organism is extremely difficult and when some investigator, as a result of long and careful experiments and observations, thinks he has solved the problem it is only a matter of a few years until some other equally careful investigator shows the imperfections of these investigations, throws doubt upon the conclusions and advances a new theory which looks perhaps more promising than the one just overthrown. For instance, when Crile showed us the changed condition of the cells of the central nervous system in an animal which had been subjected to shock and concluded that the essential cause of shock was exhaustion of the vaso-motor cen-

*Read at the semi-annual session of the Sioux Valley Medical Association, Sioux City, Iowa, January 21-22, 1920.

ter, we were all inclined to rest back serenely with the feeling that at last we knew the cause of shock and, since it was due to dilation of the vessels on account of the lowered tone of the vasomotor center, the treatment consisted in toning up this center which would result in a vaso-motor contraction and raise the blood pressure. Among the new remedies at that time adrenalin was the favorite. Experience taught, however, that the effects of adrenalin were transitory and that while it was not without some effect it could not be relied upon to the extent which we had hoped. As to having arrived at the true cause of shock, after a certain period of complacency on our part, Seelig, Porter and many others apparently proved that the vaso-motor center, instead of being exhausted in shock, held out until almost the last and gave way only when all other forces were exhausted. I do not believe any surgeon at the present time claims to know the cause of shock. Among the hypotheses as to the cause of shock Doctor Porter enumerates the following: "(1) the exhaustion of the vasomotor center, (2) the excitation of sensory nerves, (3) a hydrostatic fall in blood pressure, (4) vibration injuries, (5) direct wounds of the vasomotor apparatus, (6) hemorrhage." In addition to these, acidosis and a deficiency in $C O_2$ were put forward as causes.

When the World War broke out, strong hopes were expressed that the vast amount of clinical material which would be available would afford a basis for studies in the physiology and clinical manifestations of shock which would result in a definite settlement of the nature of shock and its treatment. Of the conditions to which had been attributed the cause of shock we knew that some of these were not causes but merely phenomena of the condition.

As a matter of fact a great many clinical observations were made during the war by the ablest of physiologists and clinicians. The physiologists also did a vast amount of experimental work. The British Government appointed a commission to make a special study of this condition and a number of American medical men were included in this commission.

Two new theories as to the cause of shock were brought forward by American physiolo-

gists, Doctor Porter and Doctor Cannon. Porter's theory was that shock was due to fat embolism in the medulla which lessened the activity of the vaso-motor center. He claimed that shock appeared oftenest in wounds where large amount of subcutaneous or abdominal fat was traumatized or in compound fractures of the large bones, especially the femur, where injury to the medullary cavity occurred. Cannon's theory was that shock was due to the absorption into the system of toxic proteins from the traumatized tissues and made experiments in which injury was done to a limb whose circulation was cut off by an elastic constrictor claiming that as long as the constrictor remained on, the phenomena of shock did not appear but did appear when the constrictor was removed, thus allowing the proteins from the tissues to get into the general circulation. Neither of these theories have been generally accepted and it is the general opinion that the cause of shock is still undetermined in spite of the skillful efforts made from the material furnished by the war to discover it.

I shall not go into the symptomatology of shock as the picture is so well known. It is agreed by all that the essential phenomenon of shock is an abnormally low blood pressure.

As to treatment, for many years it has been agreed that the essentials of treatment consisted of rest, as nearly absolute as possible, relief from pain, the application of heat to the body, the elevation of the feet to a higher level than the head and the administration of hot liquids, these liquids to be given by mouth, when this was possible, otherwise by rectal injections or by intravenous injections; subcutaneous injections are also efficient if the degree of shock is not too great but if the blood pressure is too low absorption from the subcutaneous tissues fails to take place.

The first essential in treatment above mentioned, namely rest, naturally precludes the performance of any operation except those of the mildest degree of severity until the patient has reacted from shock. In 1908, I wrote an article on the advisability of operating during shock. In preparing this article I referred to a large number of standard text-books on surgery, consulting American, English, French and German publications. I found that they

were unanimously against the practice of operating during shock. There was not one exception to this. I also noticed that, while works published in the decade from 1880 to 1890 devoted considerable space to the discussion of this subject, the later text-books treated it very briefly and I feel that this matter of deferring operation until the patient has reacted from shock is not sufficiently dwelt upon. The surgeons of the last century had evolved from clinical experience certain fundamental principles in the treatment of shock.

What have we learned from the experience of the Great War to add to the treatment of shock as laid down above? Porter acting upon his theory that the essential cause of shock was fat embolism and noting also that, if the patient was given carbonic acid gas by inhalation, this caused much more active movements of respiration thereby increasing the pumping action of the diaphragm and accelerating the circulation from abdomen to the chest, advocated this treatment of inhalation of carbonic acid gas and found that the blood pressure increased under this treatment. The inhalation of carbonic acid gas in shock was not new as it had been used before by Henderson, actuated however, by a different theory, namely; that there was a deficiency of $C O_2$ in the blood and that the addition of this by inhalation caused increased respiratory efforts. The practice of this inhalation of $C O_2$ however, did not become very general and while it may be useful in some cases, especially in those in which fat embolism actually is present it is doubtful whether it adds a great deal to the means of treating shock.

A phenomenon of shock, which may be one of the essential causes of the condition or only a result of the condition, which was frequently noted during the war was the fact that the volume of blood in the vessels was reduced. This is accounted for in various ways. Of course, if there has been hemorrhage the amount of blood in the vessels has been reduced from that cause. Other theories are that the plasma of the blood has passed out of the blood vessels into the tissues, that the blood has stagnated in the dilated capillaries or that the large blood vessels in the abdominal cavity have dilated so as to cause the collection of a large proportion

of the circulating blood in the abdominal cavity. Whatever the cause may be, it seems to be agreed that there is an actual reduction of the volume of blood in the general circulation and, in view of this fact, naturally means have been devised to make up for this reduction. To this end the patient must be given liquids. As stated above these are given by mouth, if possible, and should be given hot. It was found that hot liquid nourishment to patients who were able to swallow and retain it was of great value. In urgent cases, however, it was necessary to inject liquids into the veins. It was found that the intravenous injection of normal saline would raise the blood pressure but that the effect was transitory, because the normal saline quickly escaped through the walls of the vessels. In order to supply liquid which would not escape so easily solutions of acacia were advocated, six per cent of gum acacia being used. This fluid had a greater viscosity than the saline and, consequently, did not escape from the vessels so rapidly. This acacia solution was used in many cases and was praised by many but also condemned by many who thought it did more harm than good. In order to get the benefit of the increased viscosity of the acacia solution and at the same time overcome its harmful effects, Erlanger and Gasser advocate the slow and simultaneous intravenous injection of the acacia solution and a hypertonic glucose solution on the ground that the hypertonic glucose solution rapidly attracts water into the blood vessels. On the theory that acidosis is either the cause of shock or one of the important manifestations of shock to be combated the intravenous injection of alkaline solutions has been advocated.

The best of all intravenous injections is undoubtedly human blood. The technical difficulties of transfusion were largely done away with by the introduction of the citrated blood method of transfusion. The precaution must always be taken of typing the blood, that is, testing the blood of the donor and of the patient to make sure there is no incompatibility between them.

We were somewhat familiar with the value of observing the blood pressure in shock, but Porter emphasized the desirability of frequent readings of the blood pressure as an index to

the condition of the patient. In his paper on "Traumatic Shock" published in the "Boston Medical and Surgical Journal" May 16th, 1918, he speaks of what he calls the "Critical Level" of blood pressure. By this Critical Level he means the point below which the blood pressure will not usually rise again without assistance and places this level at about sixty (60) mm. taking the diastolic pressure with a Vasquez instrument. I quote the following:

"An understanding of the critical level is of the first importance in the study and treatment of shock. If the blood pressure just touches the critical level, a difference of ten millimeters of mercury may be the difference between life and death. A few millimeters above this level, recovery will usually occur spontaneously; a few millimeters below, death will follow unless skilled aid be at hand. It follows from this vital fact: (1) that procedures which at ordinary blood pressures are not harmful, or are but slightly harmful, may kill the patient at the critical level; (2) remedies that raise the blood pressure but ten or fifteen millimeters will save the patient when this rise carries the blood pressure from just below to just above the critical level."

Before proceeding to any operation in a patient suffering from shock we must therefore estimate whether the added shock of the operation will be sufficient to reduce the blood pressure to the critical level. If the operation cannot be done without so great a reduction of the blood pressure it is unsafe to proceed until still further reaction from the shock. In forming a judgment as to the safety of an operation it must not be forgotten that the anaesthetic of itself is a cause of shock and this factor must be added to the amount of operative shock expected.

There is but one exception unanimously agreed upon to the dictum that no operation

must be performed until the patient has reacted from shock and this one exception is the presence of hemorrhage which cannot be controlled except by operation. If the danger of death from hemorrhage is greater than the danger of death from the shock of the operation the danger of shock must be risked in order to control the hemorrhage.

Doctor Porter did not confine his treatment of shock to giving inhalations of carbonic acid gas but he added to this the measures which are so well grounded in the treatment of shock, namely; rest, heat and elevation of the lower extremities. He did not even allow the shocked patients to be washed or their clothing disturbed, so that it is difficult to tell how much of the improvement was due to the carbonic acid gas inhalation and how much the standard treatment of shock which he carried out.

An important measure in the prevention of shock, especially if the patient must be transported, is the immobilization of fractures and this was something that was thoroughly developed by the medical departments of the allied armies. Splints were supplied in large numbers at the front and applied at the earliest possible opportunity, so that patients were transported with comfort and avoidance of added shock from this source.

In summing up, I would say that the cause of shock is still unknown, that there is nothing absolutely new in the treatment, but that the measures to bring about an increase in the volume of circulating blood deserves more consideration than they previously received, that the frequent testing of the blood pressure as a means to ascertaining whether the patient is in condition for operation should be more generally used and that the dictum of our forefathers that a patient should not be operated upon until he had reacted from shock has been borne out by the vast experience of the World War.



MINNESOTA MEDICINE

Owned by

The Minnesota State Medical Association.

PUBLISHED BY ITS EDITING AND PUBLISHING COMMITTEE

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All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Journal itself, not to individuals.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

Subscription Price: \$3.00 per annum in advance. Single Copies 25c
Foreign Countries \$3.50 per annum.

Vol. III

July, 1920

No. 7

EDITORIAL

AMERICAN ROENTGEN SOCIETY MEETING

We are fortunate in having the twenty-first annual meeting of this national society in our state this year. Roentgenology has made such rapid strides during the past decade and promises to increase in importance not only as a diagnostic but as a therapeutic agent that we are all interested in its progress.

This year the meeting is to convene for a day, September 14th at the Mayo Clinic on invitation of Dr. William J. Mayo, where the Clinic will concentrate on cases of particular interest to roentgenologists and physicians interested in radium. It is anticipated that the variety of uses of the unknown rays will be shown in skin, jaw and face cases and in urological work and in addition in demonstrations by the Pathological and Orthopedic Departments.

Special arrangements will minimize transportation difficulties as Pullmans will be side-tracked for the day and luggage may be left in situ until the special train leaves at about 3:30 in the afternoon for Minneapolis. The visitor will select the clinic or demonstration in which he is specially interested where he will spend the morning and after luncheon he may attend a general meeting.

The following three days, September 15, 16

and 17 will be spent in Minneapolis. One special feature coming near the close of the meeting will be the Caldwell lecture, each year to be given by some speaker of national or international reputation. Dr. Walter C. Alvarez, Instructor in Research Medicine in the George Williams Hooper Foundation for Medical Research at the University of California, will speak on Gastrointestinal Peristalsis. Dr. Alvarez is well known to many of our readers and his presentation of the physiologist's view of gastrointestinal motor physiology will be intensely interesting to every internist as well as roentgenologist.

The scientific exhibit is in charge of Dr. Frank S. Bissell, Dr. C. A. Donaldson and Dr. R. R. Knight, all of Minneapolis. It is desired that all who wish to present an exhibit notify the committee in advance so that ample provisions may be made. It is hoped that an extensive exhibit may be shown at this meeting.

IS SMALLPOX CONTROL VANISHING?

A review of the public health reports issued by the Treasury Department shows a marked prevalence of smallpox pretty generally scattered all over the United States. In view of the fact that an increase of smallpox has followed almost every war in which this country has been engaged, consideration of the presence of this disease is timely.

Toronto experienced a large epidemic of smallpox during the past winter. Detroit shows an unusual number of cases at the present time. The same condition is present in Minnesota. Particularly in Minneapolis are many cases of the disease reported continuously. California is experiencing the same condition. Very fortunately for all concerned the disease is mild and the death rate from it is practically negligible. Careful analysis of the cases in all places mentioned shows that over 95 per cent of the infections occurred among those who had never been previously vaccinated. A very small fraction occurred among those whose vaccination was very old. Almost no cases occurred among those who had been recently successfully vaccinated, and in this group it is very reasonable to doubt whether or not the diagnosis of smallpox was justified.

Prior to Jenner's discovery of the value of

cowpox vaccination the world contributed millions of lives to this disease. During the nineteenth century the results of the discovery contributed markedly to the control of what was then a most serious disease. It is now rare to find a person marked by smallpox. Formerly one without pox marks was a curiosity.

Is history about to repeat itself? Has our carelessness and contempt, bred of familiarity and the mildness of the infection, resulted in undoing the great work accomplished during the previous century? Is it possible that by letting up on our vaccination requirements for school children and others that we are rearing a new generation of susceptibles who, when their numbers become sufficient, will supply a fertile field in which smallpox again can play wholesale havoc?

Very few of the cases which occur among the reports are among the foreign born. Presumably the strict vaccination laws in European countries are responsible for this. It is frequent to meet group histories where every member of the family has had mild smallpox except the oldest son who was successfully vaccinated in the army. The roving colored adult male is showing eight times as much smallpox in proportion to his numbers as the Caucasian. Vaccination among the Negro is rare unless he has been in army service, railroad service or other employment where strict insistence is placed on this procedure.

It is easy to put off vaccination. It requires continuous effort and teaching to secure vaccination of a large proportion of the population when no compulsory vaccination laws are in effect. We should rigidly insist on vaccination for all children admitted to any public or private school. We should continue our efforts to instruct the people in this regard at all times. We should not wait for an epidemic of malignant smallpox to stimulate us to do this. We cannot fold our hands in utter complacency and leave the entire job of teaching the people to city and state board of health, to voluntary health agencies or to health columns in newspapers. Each physician is potentially a health officer. Each physician should accept a certain degree of responsibility in the matter of instructing the family with whom he comes

in contact. By concerted action of all the physicians in the state constantly advertising vaccination of the young children in all the families with whom they come in contact, we will accomplish much to rid the state of the constant presence and occasional epidemic of this disease in mild form and protect the citizens against the ravages of it in malignant form.

C. E. S.

MEDICAL SUPERVISION OF SCHOOLS

The increasing emphasis which has been put on the value of preventive medicine has very properly been expressed in the development of medical supervision in the schools. Throughout the country efforts are being made more and more to control contagious diseases in the schools where conditions are so favorable for their spread, to prevent the disgraceful sacrifice of children's teeth and further increase the nutrition of the youngsters by means of nutritional clinics and out-of-door classes.

The appalling percentage of physical and mental defectives in the young men of the country, disclosed by the recent army draft has only further emphasized the need for preventive measures. While the medical profession is opposed to socializing medicine to the abolition of private practice, we always have been and always shall be in favor of social measures to prevent the development of disease, unbusinesslike as it may seem.

It would be a mistake for a state, county or municipality to allow the H.C.L. to reduce its appropriations for this line of activity. The State Board of Health is being forced to curtail its activities to the detriment of the health of the state because a dollar today goes only as far as fifty cents yesterday and we fear will look like thirty cents tomorrow. With the change in municipal officials, such as has just taken place in St. Paul, will come the necessity for properly apportioning the funds which will be insufficient to meet all demands. During the previous regime the one school physician was given two assistant physicians and two dentists and the force of school nurses was increased from ten to twenty. Will a backward step be necessary and a false economy be instituted to the detriment of the public health. The activities of this particular department

should be increased and parochial schools should receive some assistance.

The steps taken in New York and Chicago for making diphtheria vaccination available to school children is another preventive measure which should be instituted in the city schools of the state. Diphtheria toxin-antitoxin vaccination is no longer in the experimental stage and universal use promises to strike off one more serious disease from the long list affecting humanity. This so-called "diphtheria T. A." is used and recommended by the New York and Chicago Health Departments for the universal vaccination of children. With the approval of our state and city health authorities and the sanction of the school medical supervisors opposition can be expected only from that ever present few, of bizzare mental make up, who delight in being different and opposing any measure, new or old.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

RED RIVER VALLEY MEDICAL SOCIETY

The midsummer meeting of the Red River Valley Medical Society will be held at Warren, Minn. July 8th, 1920. A full days program of general interest is being arranged for. There will be morning and afternoon sessions. Preceding the morning session operative and bedside clinics will be given at the Warren Hospital. The regular society banquet will be held at the Hotel Warren at noon. Physicians are urged to bring their ladies for whom suitable entertainment will be provided. Those desiring to attend the meeting are requested to notify the secretary Dr. H. M. Blegen, Warren, Minn.

BLUE EARTH VALLEY MEDICAL SOCIETY

The semi-annual meeting of the Blue Earth Valley Medical Society was held May 27, 1920 in Fairmont, Minn. The following are the officers: President, Dr. J. A. Broberg; Vice-President, Dr. R. C. Farrish; Secretary, Dr. R. C. Hunt; Trustees, Drs. A. Gullixson, W. J. Richardson and F. N. Hunt.

MINNESOTA PUBLIC HEALTH ASSOCIATION COLUMN

By Dr. H. W. Hill, Exec. Sec. M. P. H. A. Shubert Building, St. Paul, Minn.

"MAKING FRIENDS WITH THE PUBLIC"

SUGGESTION NO. 2

Medical men as individuals are citizens of high standing; but "medicals in bulk" are too often looked upon as untrustable cranks, grouches, faddists, impracticable dreamers, or profiteering trust members, ironclad and domineering.

These futilely absurd notions are based on lack of understanding by the public from which misunderstanding a previous article under this caption suggests at least one way of escape.

It would appear however, that "medicals in bulk" can never achieve the status of the medical man as an individual unless "medicals in bulk" visualize themselves in bulk to the public, as rendering service *in bulk*.

It is on the service basis that the medical man as an individual has achieved his often enviable, sometimes unique, influence upon his associates. It is on the service basis that the Rotary Clubs and Commercial Clubs have presented favorable the business man in bulk. It is on the service basis that the "medical man in bulk"—the Medical Society, to be as concrete as we may—must reach the same enviable standing.

Now in what sort of service? The public have considered, more or less blindly, and have decided more or less absurdly (as it seems to us) that services in **public health** are not appreciated when coming from the medical man in bulk.

The reasons for this state of public mind is perhaps guessable, but we may at the moment neglect these reasons, since the fact itself is so clear: so very clear is it that medical men in bulk have begun openly to withdraw from Public Health endeavors, particularly legislative; openly and avowedly for the reason that their motives are misunderstood; and that their support of public health measures is, for that reason, not unfrequently a detriment rather than an aid. Our belief is that the public service which a medical society can give—each city society in its own city, each county society in its own county, each district society in its own district—should take the form of the *Periodic Examination Clinic*. No treatment; diagnosis and advice alone, the latter chiefly concerning the advisability or otherwise of treatment—and such work offered free as to service only, under the auspices of the Medical Society, say once a month in suitable localities, the expenses to be borne by county agencies—the Minnesota Public Health Association local branches (County Public Health Associations) for example. These expenses will be but small—the results should be extremely



valuable, if only in inculcating the desirability of annual examinations for all concerned.

To combine suggestions No. 1 and No. 2, let every County Medical Society willing to try this out arrange a combined meeting with the public (the local County Public Health Association will gladly assume the advertising to the public of this event).

Then let the proposition be discussed of Periodic Examinations, of their value particularly in heart disease, cancer and tuberculosis, as well as in hundreds of minor affections; and see if some concrete plan locally applicable cannot be worked out.

Any County Medical Society can write to our Headquarters at the Shubert Building, St. Paul, and be placed fully in touch with the County Public Health Association or supplied with related information.

NEW AND NON-OFFICIAL REMEDIES

During May the following articles have been accepted by the Council on Pharmacy and Chemistry for inclusion in New and Nonofficial Remedies:

Dietetic Cellulose Co.:

Cellulflour

Intra Products Co.:

Ven-Iron Cacodylate

Ven-Iron Cacodylate with Sodium Chloride.

Barbital-Chiris.—A brand of barbital (see New and Nonofficial Remedies, 1920, p. 82) complying with the N. N. R. standards. Antoine Chiris Co., New York.

Barbital Sodium-Chiris.—A brand of barbital sodium (see New and Nonofficial Remedies, 1920, p. 83) complying with the N. N. R. standards. Antoine Chiris Co., New York.

Condensed Vitalate.—A pure culture of *Bacillus bulgaricus*. It is designed for internal administration (see general article, Lactic Acid-Producing Organisms and Preparations, New and Nonofficial Remedies, 1920, p. 156). The preparation is distributed by the manufacturer only. Vitalate Laboratories of California, Pasadena, Calif. (Jour. A. M. A., April 3, 1920, p. 951).

Elixir Barbital Sodium-Abbott.—Each fluidounce contains barbital sodium-Abbott (see New and Nonofficial Remedies, 1920, p. 84), 20 grains. Abbott Laboratories, Chicago.

Aromatic Chlorazene Powder.—A powder composed of Chlorazene (see New and Nonofficial Remedies, 1920, p. 137), 5 per cent; sodium bicarbonate, 5 per cent; eucalyptol, 2 per cent; saccharin, 1 per cent; and sodium chloride, 87 per cent. Abbott Laboratories, Chicago.

Capsules Corpora Lutea Desiccated-Hollister-Wilson 2 grains.—Each capsule contains desiccated corpus luteum-Hollister-Wilson (see New and Nonofficial Remedies, 1920, p. 204), 2 grains.

Capsules Corpora Lutea Desiccated-Hollister-Wilson 5 grains.—Each capsule contains desiccated corpus luteum-Hollister-Wilson (see New and Nonofficial Remedies, 1920, p. 204), 5 grains.

Tablets Corpus Luteum Desiccated-Hollister-Wilson 2 grains.—Each tablet contains desiccated corpus luteum-Hollister-Wilson (see New and Nonofficial Remedies, 1920, p. 204), 2 grains.

Tablets Corpus Luteum Desiccated-Hollister-Wilson 5 grains.—Each tablet contains desiccated corpus luteum-Hollister-Wilson (see New and Nonofficial Remedies, 1920, p. 204), 5 grains. The Hollister-Wilson Laboratories, Chicago.

Schick Test-Gilliland.—Marketed in packages containing a capillary tube of diphtheria toxin (standardized) and a vial of diluent, and in packages containing four tubes of diphtheria toxin and four vials of diluent. See Diphtheria Immunity Test (Schick Test), New and Nonofficial Remedies, 1920, p. 304. Gilliland Laboratories, Ambler, Pa.

Corpora Lutea Soluble Extract-Hollister-Wilson.—A sterile solution of those constituents of corpus luteum which are soluble in physiological solution of sodium chloride, containing in each Cc. 0.02 Gm. of soluble matter in addition to sodium chloride and chlorbutanol (as a preservative). For a discussion of actions and uses, see general article on Ovary, New and Nonofficial Remedies, 1920, p. 201. It is marketed in the form of Ampoules Corpora Lutea Soluble Extract-Hollister-Wilson 1 Cc., Hollister-Wilson Laboratories, Chicago.

Eucatropine.—Euphthalmine. Phenyl-Glycolyl-Methyl-Vinyl-Diacetonalkamine Hydrochloride. Eucatropine was first introduced as Euphthalmine. It produces prompt mydriasis, free from anesthetic action, pain, corneal irritation, or increase in intraocular tension. The effect on accommodation is slight and transient. Eucatropine is useful as an aid in ophthalmoscopic examinations in place of atropin, homatropine, etc.

Eucatropine-Werner.—A brand of eucatropine complying with the N. N. R. standards. Werner Drug & Chemical Company, Cincinnati Ohio (Jour. A. M. A., May 1, 1920, p. 1231).

Radium Sulphate, Radio Chemical Corp.—Supplied in the form of a mixture of radium sulphate and barium sulphate. All deliveries are made subject to the tests of the U. S. Bureau of Standards. Radio Chemical Corporation, New York (Jour. A. M. A., May 8, 1920, p. 1316).

Acetylsalicylic Acid-Heyden.—A brand of acetylsalicylic acid (see New and Nonofficial Remedies, 1920, p. 247) complying with the N. N. R. standards. Heyden Chemical Works, Garfield, N. J. (Jour. A. M. A., May 22, 1920, p. 1457).

Streptococcus Vaccine (Gilliland).—A streptococcus vaccine (see New and Nonofficial Remedies, 1920, p. 290) made from hemolytic streptococci, viridans (green-producing) streptococci and nonhemolytic streptococci. Marketed in packages of four syringes,

in packages of four 1 Cc. ampules and also in vials of 5, 10 and 20 Cc. The Gilliland Laboratories, Ambler, Pa.

Tablets Dichloramine-T, 4.6 grains.—Each tablet contains 4.6 grains of dichloramine-T-Abbott (see New and Nonofficial Remedies, 1920, p. 139. Abbott Laboratories, Chicago.

Solution Arsphenamine-Lowy.—An aqueous 0.5 per cent solution of arsphenamine possessing the proper degree of alkalinity. It is supplied in ampules containing 80 Cc. and 120 Cc., respectively, each being provided with a hypodermic needle and attachment for intravenous administration. The ampules are provided with an expiration date after which time they should not be used, and with a color standard to which they must conform. The solution is made from the particular brand of arsphenamine selected by the purchase Lowy Laboratory, Inc., Newark, N. J. (Jour. A. M. A., May 29, 1920 p. 1519).

Pituitol Obstetrical.—Pituitary Extract Obstetrical-Hollister-Wilson. An extract of the posterior lobe of the pituitary body of cattle, approximately three times the strength of Solution of Hypophysis, U. S. P., preserved by the addition of chlorbutanol. It is standardized according to the method of G. B. Roth. For actions and uses, see general article, Pituitary Gland, New and Nonofficial Remedies, 1920, p. 205. Marketed in the form of Ampoules Pituitol Obstetrical 0.5 Cc. and Ampoules Pituitol Obstetrical 1 Cc. Hollister-Wilson Laboratories, Chicago.

Pituitol Surgical.—Pituitary Extract Surgical-Hollister-Wilson. An extract of the posterior lobe of the pituitary body of cattle, approximately six times the strength of Solution of Hypophysis, U. S. P., preserved by the addition of chlorbutanol. It is standardized according to the method of G. B. Roth. For actions and uses, see general article, Pituitary Gland, New and Nonofficial Remedies, 1920, p. 205. Marketed in the form of Ampoules Pituitol Surgical 1 Cc. Hollister-Wilson Laboratories, Chicago.

Radium Bromide, Radio Chemical Corp.—Supplied in the form of a mixture of radium bromide and barium bromide. All deliveries are made subject to the tests of the U. S. Bureau of Standards. Radio Chemical Corporation, New York.

Radium Carbonate, Radio Chemical Corp.—Supplied in the form of a mixture of radium carbonate and barium carbonate. All deliveries are made subject to the tests of the U. S. Bureau of Standards. Radio Chemical Corporation, New York.

Radium Chloride, Radio Chemical Corp.—Supplied in the form of a mixture of radium chloride and barium chloride. All deliveries are made subject to the tests of the U. S. Bureau of Standards. Radio Chemical Corporation, New York.

PROPAGANDA FOR REFORM

Deterioration of Ouabain (Crystalline Strophanthin) Solutions.—Levy and Cullen, having observed wider variation in the potency of several lots of

ouabain furnished in ampules, found that the sterilized solutions were decidedly alkaline in reaction, whereas freshly prepared aqueous solutions of the drug were neutral or slightly acid. Since ouabain (crystallized strophanthin) is readily rendered biologically inert by heating with alkali, the authors ascribe the deterioration of the solutions to alkali derived from the soft glass from which ampules are often made. The deterioration may be averted by the use of containers of hard glass (Jour. A. M. A., April 3, 1920, p. 955).

Anti-Tuberculous Lymph Compound (Sweeney).—This is put out by the National Laboratories of Pittsburgh, Dr. Gilliford B. Sweeney, "Medical Director." Just how Anti-Tuberculous Lymph Compound is made today is not stated. It is fair to assume that it is not made in such a manner as to bring it under the federal laws governing the sale of serums and similar preparations. The claims made for the preparation are uncritical and unscientific, mainly of the testimonial class. When some of these testimonials were investigated, every physician who answered the inquiry regarding his previous and present opinion declared in effect that he had long since ceased to have faith in the value of the preparation. The facts are that no serum or lymph has thus far been proved to have any value in the treatment of tuberculosis. Having examined the available evidence, the Council on Pharmacy and Chemistry declared Anti-Tuberculous Lymph Compound (Sweeney) not acceptable for New and Nonofficial Remedies (Jour. A. M. A., April 3, 1920, p. 965).

Anti-Syphilitic Lymph Compound (Sweeney).—This preparation is made by or under the direction of Dr. Gilliford B. Sweeney, whose researches (?) led to the production of Anti-Tuberculous Lymph Compound (Sweeney). According to the available information, this preparation is made by suspending benzoate of mercury in lymph from the bullock. The circular exploiting this preparation makes the statement that it is seldom necessary to continue the treatment beyond two months. If one chooses to be credulous, this would indicate extraordinary power for the mercury. That any physician could be induced to place his trust in this preparation is almost unthinkable. The Council on Pharmacy and Chemistry declared Anti-Syphilitic Lymph Compound (Sweeney) not acceptable for New and Nonofficial Remedies (Jour. A. M. A., April 3, 1920, p. 966).

Pharmaceutical Houses and the Council on Pharmacy and Chemistry.—In no one direction has the Council made greater efforts than in its endeavors to secure the fullest co-operation of the various pharmaceutical houses. The difficulty has been, and always must be, the fundamental antagonism between objectives that are largely commercial, on the one hand, and purely scientific, on the other. Nevertheless, the Council has always believed that there is a possible middle ground wherein the interests of therapeutic would not be injured, but would go hand

in hand with commercial development based on enlightened self-interest. The Council has practically the undivided support of manufacturers of medicinal chemicals; but pharmaceutical firms which find it profitable to promote specialties—unscientific or ordinary mixtures of pharmaceutical or biologic products sold under trade names—have not supported the Council. The methods of the pseudo-chemical companies, whose sales propaganda in the interests of unscientific nostrums with its attending damage to scientific medicine had led to the establishment of the Council, has found their lodgment in most of the pharmaceutical houses. Is it any wonder that such firms are antagonistic to the work of the Council? When the medical profession as a unit will support the Council in its work, then such firms will find it good business policy to market products which are eligible for New and Nonofficial Remedies, but not before. The Council, constituted of scientific men working without remuneration in the interest of scientific medicine and the medical profession, expects—and rightfully—the co-operation and support of the members of that profession. What is needed is the active, sympathetic co-operation of physicians; the co-operation of pharmaceutical houses will follow as a matter of course (Jour. A. M. A., May 1, 1920, p. 1234).

Some Misbranded Drug Products and Nostrums.—The following products has been subject to prosecution by the federal authorities under the Food and Drugs Act: Quinin Sulphate Tablets and Calomel Tablets of the Drug Products Company, New York City, did not contain the amount of drug claimed. Acetphenetidin and Salol Tablets of the Carrol Dunham Smith Pharmacal Co., New York City, did not contain the amount of drugs claimed. Hosteley's Hypophosphites and Hosteley's Chemically Pure Hypophosphites were adulterated and misbranded. Stoddard's Pinus-Codeia, Salceto-Codeia Tablets, Salceto Phenylamine Ammonii Salicylate Tablets, Salceto Co. No. 2 Infant Corrective Tablets, Cannabin Co. Tablets, G. S. Stoddard & Co., New York City, were misbranded. Dr. King's Star Crown Brand Pills were sold under false therapeutic claims. Marshall's Pain Drops, Marshall's Lung Syrup, Dr. J. C. Brown's Unequaled Liquid Drops, Marshall's Blood and Liver Pills, Egyptian Oil, and Arctic Oil Liniment of the M. W. Marshall Medicine Co. were sold under false therapeutic claims (Jour. A. M. A., May 1, 1920, p. 1269).

More Misbranded Nostrums.—The following "patent" medicines have been the subject of prosecution by the federal authorities because they were sold under false claims: Seelye's Ner-Vena, a syrup containing alcohol and vegetable extractives, among which were those of juniper, wild cherry, cenna, gentian, saffrafas, uva ursi and cinchona; Hill's Rheumatic Pills, consisting of vegetable extracts, including aloes, and 5 per cent of mineral salts; Jenkin's Rheumatism, Gout and Neuralgia Annihilator, containing

over 46 per cent alcohol, salicylic acid, resinous plant extract and water. Short Stop, a syrup containing licorice and wild cherry extract, ammonium carbonate, small amounts of an antimony salt, benzoic acid, camphor, oil of anise and traces of an alkaloid. Antiseptine, a powder composed essentially of anhydrous zinc sulphate and lead acetate together with a small amount of copper acetate. Cassidy's 4X, consisting essentially of aloes, colocynth, resins, and a small amount of a mercury salt, alcohol and water. "P. G. S." (Schuh Drug Co.) consisting of plant extract including extract from a laxative drug, resin, and not more than a trace, if any, of mercury, alcohol and water. Red Cross Pile Cure, suppositories consisting essentially of cocoa butter, tannin, menthol, a lead compound, iodid, sulphate and possible acetate (Jour. A. M. A., May 22, 1920, p. 1473).

Proprietary vs. Nonproprietary.—The exhibit of the A. M. A. Chemical Laboratory at the recent New Orleans session of the A. M. A. contained a card comparing the cost of drugs sold under proprietary and nonproprietary names. The following list compared the wholesale price per ounce of drugs sold under protected (proprietary) names with the same drug sold under a common (nonproprietary) name: Aspirin-Bayer, \$0.85; acetylsalicylic acid, \$0.16. Phenacetin, \$0.65; acetphenetidin, \$0.27. Atophan, \$3.50; cinchophen, \$2.00. Kelene (10 gm.), \$0.56; ethyl chloride (10 gm.), \$0.45. Duotal, \$1.90; guaiacol carbonate, \$0.80. Urotropin, \$0.80; hexamethylenamine, \$0.21. Sulphonol, \$1.70; sulphonmethane, \$0.80. Trional, \$1.90; sulphon-ethyl-methane, \$1.00. Diuretin, \$1.75; theobromine-sodium salicylate, \$0.70. Aristol, \$1.80; thymol iodide, \$1.00. Economy as well as scientific prescribing demands the use of nonproprietary names whenever possible (Jour. A. M. A., May 22, 1920, p. 1473).

Cotton Process Ether.—The Dupont Chemical Works have decided to present "Cotton Process Ether" to the Council on Pharmacy and Chemistry for consideration, and the ether will be thus defined: An improved anesthesia ether consisting of highly refined diethyl oxid with approximately two volumes of ethylene, one-half volume carbon dioxid and one per cent by weight of ethyl alcohol (Jour. A. M. A., May 22, 1920, p. 1474).

Fumes of Iodin.—For some time manufacturers have urged substitutes for tincture of iodine, claiming that the substitutes were free from the undesirable properties of the tincture and at the same time possessed special virtues which the tincture could not possess. More recently, attention has been directed to the administration of iodine in the form of vapor. Luckhardt reports that they are rapidly and completely absorbed. It was found that the administration of iodine through the respiratory passages even in small quantities is fraught with great danger. Such administration induces dyspnea, and when it is given in large quantities, acute and fatal

pulmonary edema ensues within twenty-four hours. When respiratory disorders are present at the time of the administration, the fatal edema supervenes very quickly (Jour. A. M. A., May 29, 1920, p. 1521).

The Short and Catchy Name.—A laborer went to a Brooklyn physician for treatment and was given three prescriptions. One of the prescriptions called for "Laxol," the word being written on a piece of blank paper without directions. The drug clerk misread the prescription and dispensed an "original" bottle of "Lysol," which bore the usual poison label. The man drank the entire three ounces of "Lysol" and died. Laxol is a flavored and sweetened castor oil, and there is no excuse for prescribing it (Jour. A. M. A. May 29, 1920, p. 1524).

Hostetter's Bitters.—Hostetter's Celebrated Stomach Bitters is declared to contain 25 per cent of alcohol. Analyses in the past have shown that the alcohol content has varied widely at different times, the amount having never been less than 25 per cent by volume, but sometimes as high as 43 per cent. A recent analysis by the A. M. A. chemists showed 24.72 per cent of alcohol by volume, small quantities of cinchona alkaloids (about $\frac{3}{4}$ grain per fluid-ounce) and no other therapeutically active ingredients in appreciable quantities. Six fluidounces of the preparation (6 doses) were dealcoholized, the solution evaporated, the residue mixed with milk sugar, the mixture placed in capsules, and the capsules swallowed at one dose by a healthy man. No effects were noted. It is evident that alcohol is by far the most active ingredient in Hostetter's Stomach Bitters. The analysis failed to reveal the presence of any drugs in quantities that would prevent the preparation's being used as a beverage (Jour. A. M. A., May 29, 1920, p. 1534).

OF GENERAL INTEREST

Dr. Walter Courtney of Brainerd has returned from Florida.

Dr. Wm. Friesleben of St. Cloud has been appointed coroner.

Dr. A. J. Rudolph of Waseca has moved to Milwaukee where he will practice.

Dr. H. B. Weinburgh and Dr. Scarborough of Waterville are planning to open a hospital.

Dr. and Mrs. J. L. Lynch of Winona have returned from a three months sojourn in California.

Dr. Theodore Bratrud has returned to Warren from California where he spent the winter.

Dr. P. D. McCarty has severed his connections with the Biwabik hospital and has moved to Babbitt.

Dr. R. G. Doupe formerly of Upsala has entered into partnership with Dr. E. E. Hall of Little Falls.

Dr. Pierre A. Hilbert of Melrose has been appointed by Governor Burnquist to the state board of control.

Dr. M. A. Desmond formerly of Raymond, Washington, has associated himself with Dr. F. A. Allen of Crosby.

Dr. Knut Hoegh of Minneapolis celebrated his seventy-sixth birthday, April 15th. He still attends daily to his office practice.

Dr. D. Edmund Smith of Minneapolis received his second decoration from the French government; it is the Medaille Reconnaissance Francals.

The United States Civil Service announces a competitive examination for junior physiologist and assistants in psychotherapy and occupational therapy. Those interested should apply to the Civil Service Commission at St. Paul.

Dr. Harry J. Scholtes has returned from overseas to his home in Wabasha. He went to Europe in 1918 as a member of a medical unit and served to the end of the war. Later he entered the medical department of the Red Cross.

In Vienna even the essential drugs such as quinine, cocaine and morphine are numbered among the necessities conspicuous by their absence. The American Red Cross has instituted a method of rationing these drugs by dispensing them at a nominal price through five reliable pharmacies.

We are informed that two French scientists, Dr. Lorman and Dr. Comandon, have worked out a radiocinematograph or combined x-ray and movie. Of how much practical value such an application will be, is questionable. The fluorescent screen should be more serviceable.

Drs. W. G. Crandall and C. J. Ehrenberg, both assistant city physician who have been stationed at the Minneapolis General Hospital for the last three years have resigned and will take up private practice. Dr. Crandall will locate in Minneapolis, and Dr. Ehrenberg will locate at Willmar.

Alpha Omega Alpha, Honorary Medical Fraternity, announces the election of the following members from the senior medical class: W. G. Benjamin, W. F. Cantwell, Frances Ford, W. W. Denny (deceased), L. H. Fowler, C. G. Gault, F. C. Kinsman, H. I. Moersch, J. L. Mills, M. E. Ryan, W. F. Widen, H. G. Zanger.



PROGRESS

Abstracts to be submitted to Section Supervisors.

MEDICINE

SUPERVISORS:

F. J. HIRSCHBOECK,
FIDELITY BLDG., DULUTH.

FLOYD O. WOODWARD,
DONALDSON BLDG., MINNEAPOLIS.

ASTHMA, HAY-FEVER AND ALLIED CONDITIONS. Francis M. Rackemann. (Med. Clin. No. Am. vol. 3, No. 4.) The author feels that we now have conclusive proof that asthma, hay-fever urticaria and angioneurotic edema are diseases due to hypersusceptibility to foreign proteins. The individuals suffering from these diseased states are in a condition of natural sensitization which is manifested in various ways. The theories as to the causes of the hypersensitive state are all ill-defined, but they are founded on the fact that when a minute portion of the protein substance to which the patient is sensitive, is brought into contact with his skin or mucous membrane, a violent reaction takes place; but repeated injections of the same protein will many times bring about desensitization and relief of the clinical condition.

This state of natural sensitization in man is usually multiple, that is due to a number of foreign proteins. It occurs in about 10 per cent of all individuals and is inherited according to the Mendelian laws. No antibodies are demonstrable in the blood in persons naturally sensitive, although they are present in acquired sensitization in man (for instance in serum reactions.) From these and from other facts it seems that the condition of natural sensitization is not a true anaphylaxis, as we have been accustomed to think.

The information required for the diagnosis of these diseases includes (1) a careful history based on familial idiosyncrasy and personal susceptibility to one or more proteins, (2) physical examination, (3) local reaction to the various purified proteins as developed by the skin test.

The vast majority of these patients require extensive and careful study as the treatment usually depends on this study. If one or more protein to which the patient is sensitive can be found, the preventive treatment will be (1) instructions as to the avoidance of ingestion of or contact with the protein or (2) desensitization with the specific protein. The desensitizing treatment is limited to those proteins soluble in bland solutions. Severe reactions sometimes occur unless the process is cautiously carried out.

FLOYD O. WOODWARD.

CHRONIC NON-TUBERCULOUS LUNG INFECTION. C. G. Field, M. D. (Am. Jour. Med. Sc. Vol.

159, No. 3) calls attention to the existence of a chest condition which may follow influenza, measles or whooping cough and which may occur both in children and adults, often being mistaken for tuberculosis. While these cases have practically identical symptoms as bronchiectasis, the author believes the condition is distinctly different altho he admits that a percentage of these cases develop bronchiectasis.

He calls attention to the fact that children have a large amount of connective tissue in the bronchi and alveoli which becomes easily infected permitting a chronic dilatation of the blood vessels to occur. Chronic respiratory irregularities such as nasal sinusitis, adenoids and diseased tonsils seem to be frequently associated.

A great variety of bacteria have been reported by various authors. Altho little opportunity has been offered for study of the associated pathology Muller believes that it "may consist of a localized bronchitis with lobular distribution which may clear up or persist in a subacute form, offering a site predisposed to exacerbations and increased tendency to fibrosis."

The X-ray may show simply some fibrous thickening.

The author believes that these cases may show any of the symptoms of tuberculosis except that no tubercle bacilli are found on repeated examinations and there is not the nutritional disturbance so characteristic of tuberculosis. These cases are extremely chronic, are prone to have exacerbations with coryza, fever, increased cough, tightening of the chest, frequent pain on the affected side and even occasionally a slight effusion.

Physical signs as a rule are insignificant but subcrepitant rales may be heard over the affected area which is usually a lower lobe and the breath sounds may be somewhat harsh. Some curving of the finger nails was found in two of the author's cases. The author believes that the inverted position is important in the treatment of this condition, having a patient lean over the foot of the bed for 15 minutes 3 or 4 times a day may be required to begin with. Inhalations of Compound Tincture of Benzoin sometimes assists. Lung exercises such as blowing into bottles and the avoidance of tobacco smoke and dust also aid. Moving to a warmer climate may lessen the tendency to exacerbation. Vaccine does not seem to help.

AN EXPERIMENTAL STUDY OF A POSSIBLE MECHANISM FOR THE EXCITATION OF INFECTION OF THE PHARYNX AND TONSILS: Mudd, Stuart and Grant (Jour. Med. Res., Boston, 1919, 40, 53). Common experience and the more sophisticated observations expressed in the majority of laryngologic and pathologic texts are agreed that excessive chilling may be an efficient factor in the excitation of the common "cold" or, more correctly stated, as the writer hopes to show in a later publication, in

the excitation of sporadic pharyngitis, tonsillitis or rhinitis, as distinguished from the epidemic coryza. As to the mechanism of excitation, current opinion has gone curiously astray; reasoning by analogy from the behavior of the viscera of chilled animals, the belief has been widely circulated that the effect of cold upon the body surface is to produce congestion of the upper respiratory mucous membranes. In the paper here abstracted it is shown that the opposite of congestion, namely, ischemia, in the mucous membranes of the palate, faucial tonsils, oropharynx and nasopharynx results from cutaneous chilling.

The method employed was that of direct measurement of mucous membrane temperature variations coincident with chilling of the body surface. Special means were devised for holding the terminals of one thermophile in opposition with the mucous membrane and of another with the skin surface; these thermophiles were connected with a rocking key with a galvanometer, with the aid of whose readings the mucous membrane and skin temperatures could be readily computed. Chilling was effected by unwrapping the subject and turning an electric fan on his bared lower back.

Respiratory rate was kept constant by breathing with a metronome, and depth with the aid of abdominal and thoracic pneumographs. With the chilling employed, no significant change in blood pressure or temperature occurred; such minimal alteration of blood temperature as did accompany chilling indeed was a slight elevation, followed on rewrapping by a slight fall. The temperatures of the mucous and skin surfaces, which were open to the air of the cold room, were, therefore, dependent upon the rate at which blood was circulated through them. Local vasoconstriction produced a fall in surface temperature, vasodilation a rise. This thermal method was checked by direct observations of color change with chilling and warming; the results of the two methods were entirely consonant.

Temperature curves obtained as described showed a parallel fall for both mucous membrane and skin, with chilling of a distant area of the body, indicating reflex peripheral vasoconstriction and local ischemia. When the subject was warmed again, the temperatures of the mucous membranes of the palate and pharynx rose, though not to their original level. Tonsillar temperature rose above its original. The skin occupied an intermediate position, reacting about to or a little above its initial temperature.

Inhalation of amyl nitrite, which causes peripheral vasodilation by a direct relaxing effect upon the smooth muscle of the arterioles, produced a sharp transient rise of skin and mucosa temperatures parallel to the flushing of the face. Mechanical irritation is apparently also capable of checking momentarily the vasoconstriction during chilling and of causing a slight transient vasodilation. A pharynx, the site of chronic inflammation of almost

two years' standing, and attributed to excessive smoking, showed no fall in temperature in chilling, but a characteristic amyl nitrite response. The reflex arc must therefore have been interrupted in its peripheral motor elements by the inflammation or the factors responsible for the inflammation. A throat with a history of inflammation extending back only a week similarly showed on inspection no blanching with chilling. The curve of an acutely inflamed soft palate was markedly depressed by inhalation of amyl nitrite. Evidently the vessels were virtually maximally dilated in the inflammation, and increased respiration.

Scar tissue on the body surface showed reflex vasoconstriction parallel to that of the neighboring skin. The earliest scar tested and thus proved to have vasomotor fibers was at the site of an operation, performed a month before, for removal of a keloid.

In four instances exposure was followed by a "cold" or sore throat. The mucous membranes of one subject remained normal after sixteen exposures. It seems wiser to defer saying much about interpretation until a later writing. It may be said at once, however, that it does not seem in the least improbable that the ischemia of the mucous membranes resulting from the cutaneous chilling might so disturb the equilibrium between the host and the pathogenic bacteria so often found lurking in the tonsillar crypts and folds of the pharyngeal mucosa as to excite infection.

CARL L. LARSON.

OCULAR COMPLICATIONS DUE TO TYPHOID INOCULATIONS: F. Phinzy Calhoun (Arch. of Ophth. vol. 47, No. 6) records five cases of uveal infection following inoculations as a typhoid preventative. In reviewing these five cases one notes evidences of uveal inflammation apparently induced by the inoculation of the typhoid vaccine.

Morax was the first to call attention to eye complications following typhoid vaccine inoculation in 1916, followed later by Prelat, Rousseau, Bussey, Ginestous and Gloagen, and de Lapersonne. In 1917 the French Advisory Military Commission appointed de Lapersonne to investigate whether or not anti-typhoid inoculations could produce eye complications. He concluded that some eye cases that had been reported were not well established especially those cases of acute purulent metastatic iridocyclitis due to faulty technique, poor vaccine, or latent infection in the patient. He added, however, that there are a few cases that were closely studied and that there is every reason to believe that eye complications may be attributed directly to the use of the vaccine. He believes that the vaccine may excite an iridocyclitis in an eye that has been previously affected or may produce the initial attack in a patient either syphilitic or rheumatic. This investigator holds that there is a certain analogy between

such an occurrence and the eye reactions which occasionally follow the injections of tuberculin and arsenical preparations. He advises that before a typhoid vaccine inoculation the patient be subjected to an ophthalmological as well as a medical examination. He would exclude from inoculation all patients especially those over forty years of age who are proved tuberculous, syphilitic or arthritic or who have lesions of the uveal tract.

P. D. BERRISFORD.

INFLUENZA AND TUBERCULOSIS: J. Burns Amberson and Andrew Peters (Am. Rev. Tub., April, 1920). Amberson and Burns supplement a previous communication on epidemic influenza among patients and employes of the Loomis Sanatorium, Loomis, New York, with a further analysis of the histories of patients who had influenza before entering the sanatorium and a record of the incidence and fatality of this disease among former patients. They also give a critical review of recent literature on the subject.

Of 1,227 traced former patients, 70 contracted influenza and 16 (22.9 per cent) died of the disease. Of 199 new patients admitted between November 1, 1918, and November 1, 1919, 42 or 21.1 per cent gave a definite history of influenza. Of these 42, 18 knew they had tuberculosis prior to their influenza, while 26 gave a history of previous symptoms that were presumably tuberculous. In 12 cases the onset of tuberculosis was definitely post-influenzal.

The authors conclude that tuberculosis does not confer an immunity to influenza, that influenza is not less severe among the tuberculous, that among their own patients the case fatality was higher than among the general population, that among a certain number of individuals influenza marks the inception of pulmonary tuberculosis, and that to ignore or deny the possibility of pulmonary tuberculosis as a sequela is to unduly defer diagnosis and early treatment.

G. J. HIRSCHBOECK.

ALBUMINURIA IN YOUNG MEN: Roger I. Lee has made observations on 5,000 young men, between the ages of 16 and 24, and states that 5 per cent of these men on a routine physical examination showed albuminuria in a single specimen passed at the time of the examination. The actual percentage of Bright's disease was 1/10 of 1 per cent.

He has followed many of these cases for over five years and states that as far as is known none of the cases of albuminuria which did not present other evidence of nephritis, so that the diagnosis of nephritis could be made at the time of the examination, has subsequently developed nephritis. Re-examination of 100 unselected students showed that 5 per cent of these 100 had albuminuria at the time of the examination. However, it was not the same 5 per cent which had albuminuria at the first examination. As

the cases of albuminuria were observed, there was a marked tendency for the condition to disappear. Diet was not found to have any essential influence upon the disease. Dr. Lee states that albuminuria should, of course indicate a careful search for a possible nephritis, but that albuminuria without nephritis in young men has been the cause of much needless alarm. It should be recognized as an abnormal finding perhaps, but generally temporary, and not of a nature to warrant interference in any way with the normal activity of these young men.

FRANK W. SPICER.

STUDIES ON EXPERIMENTAL PNEUMONIA — I. PRODUCTION OF PNEUMOCOCCUS LOBAR PNEUMONIA IN MONKEYS:

Francis G. Blake and R. L. Cecil (Jour. Exper. Med., April 1, 1920). This is the first of a series of ten papers detailing experiments conducted on monkeys with artificial conditions avoided as far as possible. Types I, II, III, and IV of highly virulent strains of pneumococci were used. The method of inoculation was by direct intratracheal injection in amounts of from .000001 Cc. to 1 Cc. of an 18 hour culture, diluted to 1 Cc. when the smaller doses were used, to give uniformity in quantity of fluid. Careful clinical records, leucocyte and differential counts, and blood cultures were made. Autopsies were done in all fatal cases.

Thirty-seven injections were given: (thirty-one of type I, two of type II, three of type III, and one of type IV.) Pneumonia was produced in 32. The noticeable features were rapid development of high fever and leucocytosis, early bacteremia, and typical leucocytic reaction of non-fatal pneumonia (preliminary high P. M. N. leucocytosis followed by a fall to normal and a secondary rise). The first fall in the leucocyte count was coincident with the height of the bacteremia.

This work tends to show (1) that contact infection depends upon the entrance of virulent organisms into the respiratory tract below the larynx. (2) Their presence in the upper respiratory tract is not sufficient to produce pneumonia. (3) Subcutaneous or intravenous injections failed to produce pulmonary localization, although septicemia developed. Control with steril broth, killed cultures, and avirulent cultures were negative.

The authors feel that this series gives proof of the bronchogenic origin of pneumonia; that pneumonia develops only when the infecting agent is introduced into the lower respiratory passages and that the pneumococcus is incapable of initiating an infection in the normal upper respiratory tract.

T. A. PEPPARD.



SURGERY

SUPERVISORS:

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LOWRY BLDG., ST. PAUL

VERNE C. HUNT,
MAYO CLINIC, ROCHESTER.

HYPERPLASTIC TUBERCULOSIS OF THE INTESTINES: Seward Erdman (An. Surg., May, 1920). The serous form of tuberculous peritonitis is not uncommon and is often benefited by laparotomy and the removal of the appendix or fallopian tube which may be the focus of infection. In plastic or serofibrinous tuberculous peritonitis, however, and in ulcerative entero-peritoneal tuberculosis the prognosis is much less favorable. Factors which constitute indications for surgery in chronic hyperplastic tuberculosis of the intestines and which influence the results are the slow growth of a painless tumor with tendency to stenosis and obstruction, limited area of involvement permitting of excision, the attenuation of the tuberculosis infection in the lesion, and the comparative freedom from association with active pulmonary tuberculosis.

The author reports six cases in full in the original article. Tuberculosis of the intestine is encountered in four types. 1. Ulcerative type, which is a common and often primary lesion in children and a secondary lesion in adults with advanced pulmonary tuberculosis. 2. The cicatricial or stenosing type, the result of a completely healed ulcer. It usually occurs in the small intestine and may be multiple, rarely causing obstruction when found in the large intestine. 3. The entero-peritoneal type selects the ileocaecal region and combines ulceration with hyperplasia, involving the adjacent peritoneum, mesentery and lymph nodes. 4. Chronic hyperplastic tuberculosis constitutes 85 per cent of all tuberculosis of the intestines in adults. It is essentially a disease of the cecum, but is also found in the terminal ileum, the flexures of the colon, and the rectum.

The average age in the author's reported cases is just under 30 years. There is a difference of opinion as to whether it is a primary lesion or secondary to pulmonary tuberculosis. In four of the author's six cases there were definite signs of pulmonary tuberculosis. The characteristic pathology of hyperplastic tuberculosis is that of a massive thickening of the intestinal wall, especially involving the submucosa and subserous layer. The tendency is to stenosis and obstruction and usually the entire circumference of the cecum is involved. The submucosa is the seat of the earliest and greatest hyperplasia, and tubercles and giant cells are most frequently found here. The muscle coats are little affected. The overlying peritoneum is much thickened and the lymph nodes are practically always enlarged. Tuberculous peritonitis or perforation may occur.

The onset is slow and the early symptoms are indefinite gastro-intestinal disturbances, frequently with alternating constipation and diarrhoea. Fever, weight loss, and so forth, occur late unless due to pulmonary or other complications. Pain occurs with stenosis. In the author's series symptoms were present for only three months.

The differential diagnosis includes carcinoma of the cecum, appendicitis, chronic intussusception and diverticulitis or carcinoma of the sigmoid. Ileum alone, 1 case. Ileum and cecum, 1 case. Cecum or ascending colon, 2 cases. Cecum and rectum, 1 case. Sigmoid, 1 case.

Radical resection, with appropriate anastomosis, is the operation of choice. Partial exclusion is the simplest and safest procedure as a palliative treatment. An artificial anus in the afferent loop must be considered only as a measure of last resort.

V. C. HUNT.

THE TREATMENT OF DUODENAL FISTULA:

Stuart McGuire (Surg. Gyn. Ob., May, 1920). A duodenal fistula usually follows an operation on the duodenum or an injury to the duodenum in the course of an operation on the gall-bladder or kidney. Such fistulas sometimes develop immediately, but more often are first noticed four or five days after an operation. They are usually due to stitches giving way or tissue strangulated by ligature or forceps undergoing necrosis. The discharge of duodenal or stomach contents may be small or large. If the fistula is small and the discharge scant, the opening may close spontaneously, but usually the fistula enlarges and unless there is surgical intervention, the patient dies.

If the discharge is small and the patient's general condition good, the fistulous opening may be plugged with gauze and all nourishment and liquid by mouth withheld. However, if the patient loses strength rapidly, more radical measures should be resorted to. If the fistula has developed following a nephrectomy, the plan suggested and practiced by W. J. Mayo should be used; that is, opening the abdomen and suturing the opening in the duodenum. Deaver and others have dealt with post-operative duodenal fistulas by doing posterior gastro-enterostomies.

The author reports a case of secondary operation in which he removed a stone from the hepatic duct and did a cholecystectomy. In the course of the operation, in the presence of dense adhesions, a hole was torn in the duodenum, which was immediately sutured. On the ninth day postoperatively a large duodenal fistula developed. The condition of the patient was such that a gastro-enterostomy could not be done, so simple jejunostomy was performed, with recovery of the patient.

V. C. HUNT.

PSEUDOMYXOMA PERITONAEI: Montgomery H. Biggs (An. Surg., May, 1920). Pseudomyxoma peritonaei may be described as an inflammation or

irritation of the peritoneum, caused by the discharge of the epithelial lining and contents of a pseudomyxomatous cyst of the ovary or appendix and resulting in the production of pseudomucin and secondary tumor formation.

The author believes the etiology to be that of cellular implantation, the epithelial cells lining the cyst, together with the pseudomucinous contents of the cyst, being discharged through a rupture of the cyst wall into the peritoneal cavity. The condition was at first considered, in every instance, to be the sequel to a previously existing ovarian cyst, but Fraenkel, in 1901, observed that the appendix may be the seat of the primary pathology. In three of the author's six cases the appendix was affected. Two of these showed transplants, and one was the seat of a mucocele. Secondary involvement of the appendix is not remarkable, as any organ covered by peritoneum can be attached.

Pseudomyxoma has no distinctive symptomatology, and only in the terminal stages the patient shows weakness, loss of weight, cachexia, and so forth. It is usually a condition of advanced life; the author's youngest patient was 49 and the oldest 78. The course of the disease is usually not rapid. In one of the author's cases death did not occur until after nine years. The other five are living, after periods varying from sixteen to twenty-six months after operation. One patient had recurrence after twenty-six months, another after seven years. The disease is not a rapidly destructive process.

The findings at operation of the reported cases have been variable; however, there has always been a cyst of the ovary or appendix or both, and there is more or less pseudomucin in the pelvis or throughout the peritoneal cavity. In late cases there have been actual tumors on the abdominal viscera and great thickening of the tissues. The author states that all of the original tumor should be removed if possible, all pseudomucin as well, and the peritoneum carefully wiped off with gauze. If this is done, cures will often result, or the patients may be free from recurrence for many years. The six cases are reported in detail in the original article.

V. C. HUNT.

GYNECOLOGY AND OBSTETRICS

SUPERVISORS:

ARCHIBALD L. McDONALD,
FIDELITY BLDG., DULUTH.

ALBERT G. SCHULZE,
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THE HIGH CESAREAN OPERATION: Paul Bar, (Arch. Mensuelles D'Ob. et De Gyn., Vol. 8, No. 2.) The author gives an excellent review of his teaching and practice in the Tarnier Clinic with respect to the indications, limitations, method and results for the "High" Cesarean Operation, including 275 opera-

tions. He prefers to operate before the onset of labor or within the first few hours, before rupture of the membranes. He rigidly excludes any case which shows the slightest evidence of infection; fever or vaginitis. Their last 97 operations includes: 85 before the onset of first pains, 9 within 2 hours of onset of labor, once after 24 hours, and once after the rupture of the membranes and loss of meconium with no maternal or fetal mortality. Method: Bar prefers the high abdominal incision, delivers the fundus by pressure at the side of the incision, makes the uterine incision high on the fundus. He describes in detail his method on delivery of the ovum intact without rupture of the membranes. Clots are expressed by pressure and no packing is used. Ergot is given hypodermically. Bleeding was severe in only one case. He uses deep sutures of silk including the entire thickness of muscle, and superficial layer of catgut sutures.

He discusses the low operation with incision through the lower uterine segment but enters several objections: Injury to the bladder has occurred in the hands of experts, the operation can not always be completed as an extra-peritoneal procedure when it is most desired. Delivery of the fetus and membranes is sometimes more difficult. The technique is more complicated. Immediate results: Hemorrhage is claimed to be less, but is never serious. Less risk from infection in doubtful cases a point which is of advantage to those who are less rigid in their selection of cases but not to those who follow the conservative teaching of Bar and others. He believes that there is more danger of subsequent rupture of a scar in the lower uterine segment than in the fundus. Considers that with properly selected cases, the mortality will be between 1 and 2 per cent but will run to 10 or 12 per cent or higher in unselected cases. Of his own last 97 cases, there was no mortality to mother or baby. Bar considers it a safe operation when done at the proper time, on uninfected women, by a surgeon with reasonable experience, following a standard technique.

Late complications include: 1. Uteroparietal adhesions which are common but are rarely of serious consequence. In 23 cases which came to subsequent Cesarean section there was but one where the adhesions were at all extensive. 2. Rupture of the uterine scar in subsequent labor. He quotes Essen-Moller who reports 15 cases of rupture in labor following 108 operations. Young who records 5 ruptures in 74 cases, and Rongy who estimates the frequency at about 3 per cent. In his own 22 re-operated cases Bar records: 1 rupture, 2 with marked thinning of the scar, and 19 appreciable thinning of the scar. He attributes two causes: 1. incomplete apposition of the deep muscle layer, 2. Infection. He mentions invasion by placental villi as a possible but not important factor. He considers the operation sufficiently safe to be offered with proper limitations in all cases where there is: 1. obstruction either in the

bony pelvis or soft parts which renders delivery by the vagina uncertain either by forceps or version. 2. An accident which necessitates rapid delivery when the cervix and soft parts are rigid. The last class includes eclampsia and placenta previa. The results with eclampsia are not good, probably due to the frequency of infection and it is rare that other methods of delivery are not preferable. For placenta previa he would limit the operation to those cases with severe hemorrhage where the placenta covers the cervix, which is closed, and the membranes can not be reached, where maneuvers at the cervix are most dangerous. The selection of cases is a matter of careful judgment and even then some will be subjected to operation who might possibly be delivered through the vagina.

ARCHIBALD L. McDONALD.

THE LETTSOMIAN LECTURES ON TUMORS COMPLICATING PREGNANCY, LABOR AND THE PUERPERIUM OVARIAN TUMORS: Herbert R.

Spencer, (London Lancet, February 28, 1920.) This lecture is based on a series of 55 cases ranging in age from 20 to 43 years, 30 being the average. This group of 55 patients had had 150 children and 35 abortions. Forty cases were not operated on during pregnancy with the result that five of them aborted but all mothers recovered from the abortion or labor. Fifteen cases were operated on during pregnancy, and with certain allowances the abortion rate was 1 in 3; again all mothers recovered.

All tumors were benign. They were cystadenomatous in 33 cases, dermoids in 15 cases, ovarian fibroids in 3, parovarian in 6; torsion occurred in 18 cases, rupture of the tumor in 3 cases, suppuration in 8, incarceration of the tumor in the pelvis in 5 cases and adhesions were found in 26 cases.

There does not seem to be any evidence of any specially rapid growth of the tumor during pregnancy but there seems to be that tendency during the puerperium. Ovarian tumors in the non-pregnant is a surgical question; in the pregnant, however, regard should be given to its obstetrical nature and due consideration given the welfare of the child and the sterility of the mother.

In view of the fact that in the cases operated on during pregnancy the abortion rate was 1 in 3, and in those not operated on only 1 in 5 which could have been reduced to 1 in 10 if more skilfully handled during labor, it seems that operation during pregnancy involves an increased risk to the child. The author's scheme of treatment, published in 1909 and not materially changed since then is as follows: During the first half of pregnancy ovarian tumors should be removed irrespective of location or size, except (1) lutein cysts complicating hydatidiform mole; (2) bilateral tumors causing no symptoms; (3) malignant cysts.

During the second half of pregnancy he removes

immediately all large and ruptured, inflamed and twisted tumors. Small tumors in the abdomen or easily pushed out of the pelvis, if without symptoms may be watched and removed at end of pregnancy, or end of the first stage and after delivery. Small incarcerated tumors may be handled in the same way but if solid or adherent, Caesarean section should be done. During labor he advocates abdominal ovariectomy; if the tumor is solid and adherent Caesarean section may be called for. At times a vaginal ovariectomy may be done and while simpler in technique it is inferior to the abdominal route. Induction of premature labor, forceps, version and tapping of the cyst as a means of overcoming the dystocia are absolutely contra-indicated.

During the puerperium all ovarian tumors should be removed within 24 hours; if sepsis is present the operation should be delayed; if conditions are urgent, it should be immediately performed.

ALBERT G. SCHULZE.

THE LETTSOMIAN LECTURES ON TUMORS COMPLICATING PREGNANCY, LABOR AND THE PUERPERIUM: CARCINOMA OF THE UTERUS: Herbert R. Spencer, (London Lancet, March 6, 1920).

Reported cases taken from the literature give this complication as occurring once in 1,600 labors. Cancer of the cervix is very rare in women who have not been impregnated although cases of this complication in the first pregnancy have been reported.

The author's series of ten cases showed a total of 70 children and 11 miscarriages, an average of seven children and over eight pregnancies. The influence of multiparity is very clearly seen running throughout all statistics. He discusses the role played by lacerations, erosions, spermatazoa and venereal infections in the production of this complication.

The influence of cancer of the cervix, on account of obstruction, hemorrhage and infection is to prevent pregnancy, but if the latter condition does occur it tends to produce a premature delivery. The high mortality of this complication is due to hemorrhage, sepsis and rupture of the uterus. The influence of pregnancy, contrary to expectations, is not one of very marked stimulation to growth.

The most important symptom is hemorrhage; then the presence of a thin, watery, offensive, often blood-stained discharge, and lastly pain. The last is an earlier symptom in the pregnant than in the non-pregnant.

Cancer of the uterus in pregnancy always affects the cervix. Diagnosis is made by inspection, bimanual examination and the microscope and must be differentiated from tubercle and a chancre. Conditions resembling early cancer of the cervix are the various forms of erosions.

The author makes a survey of other published records.

Treatment of cancer of the cervix varies according as the case is operable or inoperable and the

child viable or not. Radiation treatment has come into prominence but in case of pregnancy might entail some risk to the fetus. In early pregnancy the operable cases are best handled by extended abdominal hysterectomy; the inoperable, if not bleeding or infected, are best treated by Porro operation after delivery.

During late pregnancy the cases should be treated by Caesarean section followed by extensive abdominal hysterectomy. Vaginal Caesarean section entails too great risk of cancer cell implantation and no case is recorded in which it has been followed by a cure.

On account of the high mortality associated with the extensive abdominal hysterectomy, the operation of restricted vaginal hysterectomy followed by radiation treatment is becoming more popular, specially during the puerperium.

ALBERT G. SCHULZE.

PEDIATRICS

SUPERVISORS:

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ROY N. ANDREWS,
MANKATO CLINIC, MANKATO.

PROGNOSIS IN OPERATIVE CASES OF HYPERTROPHIC STENOSIS OF PYLORUS: Alton Goldbloom and Ralph C. Spence (Am. Jour. Dis. Child., April, 1920.) The duration of symptoms prior to operation is probably the most important single factor affecting the prognosis. When symptoms have lasted less than four weeks, the mortality is one-third as great as when they have lasted four weeks or longer.

The mortality in artificially fed babies is more than three times that for the breast fed babies. In infants weighing 7 pounds or less, the mortality was three and one-half times as great as in those who weighed more than 7 pounds. The mortality increases in direct proportion to the amount of weight lost previous to operation. The mortality for breast fed infants who have vomited less than four weeks and who have lost less than 20 per cent of their weight is almost nil. The fatalities which occur are due to accidents usually avoidable when the operation is done by a skillful surgeon.

The postoperative management is important. Breast milk is indispensable. At first, very small quantities of diluted breast milk are given, and increases in amount and strength are made gradually. The baby is not allowed to nurse until a week after the operation. The slightest tendency to vomiting and loose stools must be regarded with grave concern. He has found it advisable for the first ten days after operation to pass the catheter immediately before each feeding. This aids in the expulsion of gas.

ROY N. ANDREWS.

RESULTS OF SOME EXPERIMENTAL WORK WITH SODIUM CACODYLATE ON ATHREPTIC INFANTS: Floyd S. Clarke and Andrew Dow (Am. Jour. Dis. Child., April, 1920.) The physician is rather frequently confronted with a type of infant, who, because of some nutritional disturbance, either fails to gain in weight, or the gain is so slight as to be almost negligible. This condition of insufficient nutrition is sometimes called athrepsia.

One member of this class of infants will take its food well, does not vomit, and there is no indication of digestive disturbance. The food may be of sufficient caloric value. Another member of this class, will tolerate only a certain amount of food. In feeding these infants, one has to be extremely careful not to overtax this food tolerance. They are particularly unable to digest any normal amount of fat. If their food tolerance is exceeded we get vomiting, diarrhea and loss of weight. In both types there is an inability to assimilate food properly. They do not do well, are below par physically, and anemic.

Six infants were used in this group. Eight injections of Sodium Cacodylate were given at intervals of four days, intramuscularly. The youngest which was six months old, received one-fourth grain, as an initial dose. This was increased until three-fourths grain was given. The maximum dose at any one time was one grain; the oldest child being fifteen months.

It was found that graduated doses given hypodermically had no toxic influence. The percentage of hemoglobin in the blood is uniformly increased. All the children showed a substantial gain in weight and one may conclude that the Sodium Cacodylate possesses tonic properties enabling the infant to take on weight and possibly to assimilate his food more properly.

ROY N. ANDREWS.

ROENTGEN-RAY DEMONSTRATION OF ABNORMALITIES OF THE GASTRO-INTESTINAL TRACT IN CHILDREN: Charles Gilman Kerley (Am. Jour. Dis. Child., April, 1920) gives a number of interesting roentgenograms of the gastro-intestinal tract which throw light on some trying feeding problems in infants and children.

He states that the digestive tract in children has been given credit for being structurally normal and the derangements being strictly functional—this, however, is very often not the case. Opaque meals and enemata show a wide variety of abnormal anatomical changes, such as, stenoses of the pylorus, ptosis of the stomach, elongated colon, elongated and sacculated sigmoid. Clinically, the disturbances are shown by poor nourishment, pain, anorexia, vomiting and constipation. He found these symptoms were accompanied by a delayed emptying time of the stomach.

Technically, he employed one part of Bismuth subcarbonate in eight parts of the feeding mixture or fermented milk—for the meal and for the opaque

enema, one part of barium sulphate to six parts of fermented milk.

After diagnosis of the underlying condition, regulation of the feeding and especially a long interval is employed. Massage and medication for obstipation, and abdominal support in cases of ptosis have been of great help in relieving the distressing symptoms and promoting better nutrition.

FREDERICK C. RODDA.

PNEUMONIA IN INFANCY AND CHILDHOOD WITHOUT PHYSICAL SIGNS: R. G. Freeman (Archives of Pediatrics, January, 1920) emphasizes an extremely important point in pediatric work, the difficulty of making a positive diagnosis of lobar pneumonia in infancy, especially when confronted with an extensive upper respiratory infection involving the ears. Fever, over-activity of alar nasi, rapid respirations with expiratory grunt suggest pneumonia and yet no physical signs in the chest can be demonstrated. A discharging ear with tenderness over the mastoid points to a possible explanation. Just here a roentgenogram of the chest may give the true differential diagnosis and prove the pneumonia may exist without physical signs. He gives a series of histories, temperature charts and plates which are entirely convincing and urges more frequent roentgen studies in these cases.

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ROENTGENOLOGY

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EARLY ROENTGEN DIAGNOSIS OF ULCERATED TUBERCULOUS COLITIS: Lawrason Brown and Homer L. Sampson, (Am. Rev. Tub., January, 1920.) The authors in a most comprehensive article on the symptomatology and diagnosis of tuberculous colitis, make a plea for earlier diagnosis in order that surgical treatment may be instituted early while there is a better chance for recovery.

This, they assert, can only be done by a carefully carried-out x-ray examination. The findings which they describe, are found only with tuberculosis of the large intestine, but maybe absent in some cases of hypertrophic tuberculosis. Both the plate and fluoroscopic methods are employed in the examination and both the ingested barium meal and barium enema are resorted to.

The diagnosis depends on abnormal hypermotility of the ingested meal as observed at six, eighteen, and twenty-four hours, after ingestion and confirmation of this hypermotility by a barium enema given under fluoroscopic control. The region where the abnormally

rapid passage of the ingested meal was noted will be found difficult to fill with the barium enema and once filled an almost immediate spasm of the affected area results which forces the solution analward.

They avoid all catharsis for 24 hours preceding the ingestion of the barium meal as catharsis can cause abnormal motility of the intestinal contents.

R. G. ALLISON.

RADIUM TREATMENT OF ENLARGED THYMUS GLANDS IN INFANTS: Arthur C. Heublein. (Amer. Jour. Roent., April, 1920.) The author lays stress on the frequency of an enlarged thymus being the sole factor in sudden and otherwise unexplained death in infants.

He quotes Friedlander of Cincinnati who states that eight and four-tenths percent of all children admitted to the out-patient department of Dr. Benjamin's clinic suffered from enlarged thymus. He urges that all children be given a thorough physical and x-ray examination before the administration of a general anaesthetic, as sudden death so often occurs at this time. Even in children who have exhibited slight if any symptoms of enlarged thymus previously.

He quotes the experimental work of Park McClure of Johns-Hopkins as proof that the destruction of the thymus has no effect upon the development, strength, activity or intelligence of the experimental animal. He therefore concludes that we need not fear to completely destroy the gland.

Until two years ago the author had contented himself with routine x-ray treatment of these cases as the results were uniformly good but not always rapid. Being confronted with an almost moribund case he applied one hundred milligrams of radium element at a one-half inch distance, filtered through three-tenths m.m. of silver at 4 portals of entry, the tube being left two hours in each position. The marked immediate improvement and permanent cure has left him to adopt this treatment as his routine. The advantages of radium over x-ray treatment are as follows: (1) It is portable; (2) it gives the desired result in one treatment; (3) it eliminates fixation of the infant necessary in x-ray treatment, this factor alone accounting for many deaths during x-ray treatment owing to the struggle of the child over being forcibly restrained; (4) radium is safer as the skin-radium distance never varies regardless of movements on the part of the patient.

He reports on 41 cases treated by this method with uniformly good and lasting results.

R. G. ALLISON.

RADIUM OR ROENTGEN RAY: William J. Young. (Internat. Jour. Surg., April, 1920.) What is known of the mode of action of radium and the Roentgen ray is described, as well as the characteristic effects of the alpha, beta and gamma rays. While the

mode of administration of the two agents is different the same reactions are produced. With the x-ray one is able to treat small lesions in less time than with radium, and for large surfaces the time difference amounts to days. Radium, however, is more nearly "fool-proof" owing to the margin of safety between massive dose and burn. Radium also require less skill; hence, to a certain extent, the growing popularity of this agent.

The essentials of intelligent treatment of the diseases responsive to radium and x-rays are the ability to accurately diagnose the character and extent of the lesion, and knowledge of technique necessary for the agent selected as well as of the reactions which may be expected. One of the reasons for the slow advancement of radio-therapy is the reluctance of those proficient in its use to explain their technique; due to the fact that so many untrained workers have adopted therapy as a "side issue."

In general, the most eligible situations for radium are those inaccessible to the Roentgen ray: (1) the nose and antrum; (2) the mouth, larynx, pharynx, oesophagus and bronchi; (3) the urinary bladder and prostate; (4) the vagina, cervix and uterus; (5) the rectum; (6) naevi and keloids. In many cases radium may be supplemented by x-rays from the outside. Roentgen ray therapy may be used over small and large surfaces, especially in malignant disease with metastasis. In mammary carcinoma with small recurrences in the scar, the author believes it a mistake to apply radium where systematic radiation of a large field is required. The Roentgen ray is usually employed in hyperthyroidism; and in leukemia it is the agent of choice. The x-ray is more efficient in extensive sarcomata, but needles of radium element or emanation buried beneath the skin will be found of special value. The greatest field of radium will be found in carcinoma of the cervix. It is also the agent of choice in uterine hemorrhage unless the patient still hopes to bear children. In extensive skin diseases the treatment is almost inclusively by the Roentgen ray.

A. U. DESJARDINS.



BOOK REVIEWS

BOOKS RECEIVED FOR REVIEW

A. M. A. Council on Pharmacy and Chemistry Reports, 1919.

New and Non-Official Remedies. A. M. A., 1920.

Surgical Clinics of Chicago, April, 1920. W. B. Saunders Co.

Medical Clinics of North America, March, 1920. W. B. Saunders Co.

Human physiology. Starling. Lea & Febiger. 3rd ed. 1920. \$7.50.

Diseases of the Nervous System. Jelliffe and White. Lea & Febiger 1919, 3rd ed. \$8.00.

Pathogenic Microorganisms. Park and Williams. Lea & Febiger. 7th ed. 1920. \$6.00.

Symptoms of Diagnosis and Disease. Hare. Lea & Febiger. 8th ed 1920. \$6.00.

Physical Diagnosis. Flint and Thacher. Lea & Febiger. 1920. \$3.00.

Diabetic Manual. Joslin. Lea & Febiger. 2nd ed. 1919. \$1.75.

Dermatology. Darier. Lea & Febiger. 1920. \$8.50.

Regional Anesthesia. Sherwood-Dunn. F. A. Davis Co. 1920. \$3.50.

Principles and Practice of Infant Feeding. Hess. F. A. Davis Co. 2nd ed. 1919, \$2.50.

A TEXT-BOOK OF PRACTICAL THERAPEUTICS.

By Hobert Amory Hare, M. D., B. SC., Professor of Therapeutics, Materia Medica, and Diagnosis in the Jefferson Medical College of Philadelphia; Physician in the Jefferson Medical College; etc. Seventeenth Edition, Price \$5.50.

During the past thirty years hitherto empirical methods have in many instances been placed upon a scientific basis. These the author has thought fit to incorporate in the work as well as to develop new lines of treatment. The new work added consists of the more modern treatment of shock, the use of Dakin's fluid and dichloramine-T by Carrel's methods and the treatment of burns with paraffine. This volume stands as the leader in texts of its kind.

DISEASES OF WOMEN. Charles M. Green, Professor of Obstetrics and Gynecology, Emeritus, in Harvard University, etc., W. M. Leonard, Publishers, \$6.00.

This book is the author's second edition. It is one of the case history series. A book of 466 pages and 173 case histories, dealing with gynecological problems during the recognized periods of female life, namely, infancy and childhood, puberty and adolescence, maturity, climacteric and senility. Also dealing with the closely allied question of normal and pathological pregnancy, labor and puerperium as influenced by gynecological conditions. It is a valuable and interesting volume.

ALBERT G. SCHULZE.